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The Sir Charles Clubbe Memorial Oration.[1]

UNVEILING THE MYSTERY OF GROWTH.

By JONATHAN C. MEAKINS, M.D., LL.D., F.R.C.P. (Canada), F.R.C.S., F.R.C.P. (Edinburgh), F.R.C.P. (London),

Physician-in-Chief, Royal Victoria Hospital, Montreal; Director of the Department of Medicine, McGill University and McGill University Clinic, Canada.

I WISH to take this early opportunity to express my appreciation of the compliment your committee has paid me by inviting me to take part in your post-graduate course and also for their confidence in asking me to deliver this Sir Charles Clubbe Memorial Oration. From time to time there appear men who by vision and originality of thought carry their community or even the world a long step forward towards greater health and happiness. Such a one was Sir Charles Clubbe. It was not my privilege to know him; I envy you who did. His work in the surgical diseases of childhood and in orthopædics was sufficiently outstanding to give him an honoured place in his profession. But his vision revealed a much greater vista. The child at birth is usually a healthy little animal, so why not keep it so! To this end he devoted his energies in organizing your baby health centres. You know, while I can only surmise, what a great boon they have been. But this was not enough. His greatest and most enduring monument is, and I hope for centuries will be, the Royal Alexandra Hospital for Children in this fair city. It is a visible token of a dream come true. You do well to keep green

[1] Delivered at the University of Sydney on May 24, 1937.

his memory, while I am fully conscious of my responsibility in helping you to this end. Sir Charles did much to help the child be a worthy sire of the man; therefore it seems appropriate to attempt to unveil the mysteries of his growth.

Since the beginnings of history, indeed up to comparatively recent times, growth was enshrouded in mystery tinged with religious awe which even approached worship. The frequent mention of giants in most mythologies leaves little doubt that man in his gropings to the truth found a necessity to explain by men of supernatural size the accomplishments of Nature which were beyond his power. It would also be but natural that they should be of a breed close to the divine, as he could not produce them himself.

Neither Mediterranean nor Eastern mythology has left us an account of the opposite in stature. It is true that the writings of Homer, Aristotle, Herodotus and others pointed to the existence of pygmy tribes in Thrace, Cana, India, Philippines, Sicily, and at the head waters of the Nile; but they did not attribute to them any divine or semi-divine power. In the Bible the word "pygmy" is never used, and "dwarf" but once. In the Scandinavian folklore there were the elves, and according to many these "little people" are with us still and those of faith may meet them, particularly in Ireland and the Western Isles.

There can be little doubt that the extremes of growth created wonder in the mind of man when he was groping to understand the mysteries of his environment, and his imagination for these things was kept alive through folklore and traditions handed down from out of the mists of antiquity.

The growth of the body and how it is regulated were accepted as a fact. Little was known concerning it, nor was there any particular scientific curiosity. It was believed that an individual's stature was dependent upon heredity and was fixed within the laws of Mendel. There was also the fatalism arising from the question: "Which of you by taking thought can add one cubit unto his stature?" This could not be answered in the affirmative.

The most casual glance over the stature of the inhabitants of the globe will reveal some races taller than others. This at first thought is attributed to heredity, but this cannot be the whole story. The more the question is studied, the more important appears to be the rôle of environment. It has been doubted that this would operate in a few generations, but evidence will be presented to indicate that this may be the case. On considering the possible effects of environment one naturally considers the most probable factors, such as physical activity, the character and quality of the food supply and the effects of parasitic and other diseases.

It might seem unjustified to draw conclusions as to the effect of environment on a race. The diminutive or pygmy races, the negrillo types of central Africa, are related to the true negro and seem to have become dwarfed through adverse living conditions. The same types are found among the negritos of the Philippines and other Pacific Islands, which seems to show that the types were differentiated before the Oceanic were separated from the African blacks. The handicap of luxuriant vegetation, which prevents agriculture, few, if any, domestic animals, tough grass, insect pests, blights and infection, would require a resistant type to survive. To these conditions may be added the natural lack of energy and aversion to labour in a tropical climate, ill-prepared food, faulty nutrition, animal parasites (intestinal and cutaneous), bad habits and secret warfare. This type had small extremities and relatively large viscera, which produces a superior vitality, permitting it to survive in a diminutive form under adverse conditions.

There are counterparts in the yellow and white races where, also through adverse conditions, similar characteristics have developed. Good examples are found in the Eskimos, the Lapps and the Siberians. These frozen desert people of the north labour under the disadvantage of a slight rainfall, scanty vegetation, practically no agriculture and few animals. But these examples are at the best but general observations leading to conclusions which may or may not be justifiable, and it is necessary before they are accepted to have proof that certain factors have been absent which are essential to growth. Therefore we must be specific, and to this end we shall examine the principal factors which promote growth under normal conditions.

Growth progresses at a fairly steady rate in the average child, with accelerations during infancy and a few years before adolescence. It is not necessarily parallel or constant in all children. Brailsford Robertson has shown that a rigid normal curve for all infants and children differs considerably in different countries and for different races. Allowances must be made for variations, which may be present in the individual, owing to unknown factors or racial inheritance, to adaptation to environment, which may not be deleterious, to inherent variability of all biological types, to the effects of a faulty dietary, to a functional abnormality or to a disease process. He has also shown that there is a certain variability in normal children, but these fluctuations are rarely of a magnitude to produce conspicuous deviations from the average standard curves. If this should be the case, it would be significant of conditions deleterious to the child's welfare.

Although the general trend of growth is a steady increase from infancy to adult life, there are detectable cyclic deviations. It is believed that in the northern hemisphere the period of most rapid growth is from April to August, that medium progress takes place from December to April, and the least from August to December. When increases of weight and of growth are compared, it is found that they do not coincide, but alternate; that is, when growth is most rapid, weight increase is least and *vice versa*. Thus during the period of April to August there is but little increase in weight, but

this period is followed by a flattening of the growth curve and a relatively sharp upward swing of the weight from August to December. During the winter and spring months (December to April) both are relatively equal. It is difficult to account for these cyclic waves. It has been found by experiment that uniform cells under uniform conditions multiply at the same rate, which implies that all genes or their molecules double at exactly the same moment. If all children were born at the same time, such a periodicity as outlined might be considered to be an inherent characteristic of the cells. But as this is not the case, one might be permitted to seek an explanation in the changing environment of alternating seasons with their changes in solar radiations and food supply. This matter is still in the realm of investigation.

It has been abundantly proven that the amount of food consumed influences the growth of an animal. There are two principal factors which determine this. One is the demand on the part of the animal, or what may be described by the simpler term of appetite. Appetite is a more or less imperfect response to a physiological need, and when an added dietary component leads to appetite stimulation the explanation is to be found in the influence exerted by this substance upon the cells themselves. Hopkins has expressed it as follows: "Any effect of the addendum upon appetite must have been secondary to a more direct effect upon growth processes." Therefore appetite and the increased consumption of food are dependent upon the demand of the tissues for an increased supply of building material. In other words, growth creates a demand for an increased food supply. The second factor is the supply available. But what initiates and perpetuates growth?

It has been demonstrated that neutral fats and carbohydrates are not necessary for growth. Proteins and their derivatives, on the other hand, are. It has been shown that certain amino-acids are indispensable for this bodily function. These are lysine, tryptophane, cystine and histidine. The information about the others is indefinite, although it is possible that they may play a part. All proteins do not necessarily contain all of these indispensable amino-acids and are therefore called incomplete; and growth does not occur on a diet of incomplete proteins. Furthermore, as all have to be present, although not necessarily in equal concentration, the addition of the missing ones will permit of growth. But, on the other hand, the rate and continuance of growth will be determined by the amino-acid present in the smallest amount, and when this is exhausted growth will cease. In addition, amino-acids are necessary for the maintenance of the body. It is seldom that the animal organism does not build up a credit balance or reserve of those materials for which it has an essential need. To this rule proteins are no exception. Boothby has found that this deposit amounts to about two kilograms in an average sized person and is combined with about ten kilograms of water, the total (twelve kilograms) amounting to about 17% of the body weight.

It is important to appreciate the source of these obligatory amino-acids. Both animal and vegetable foods may contain some of them, but the former are much more important and should comprise about 66% of the total protein intake, which should amount for an adult to at least one gramme per kilogram of body weight per day. Infants and children require more—3·0 grammes per kilogram up to one year, 2·0 grammes per kilogram up to six years, and 1·5 grammes up to adult life. These quantities are necessary for growth and maintenance. During pregnancy and lactation an increased supply is also necessary. The foods which serve best this purpose are eggs, milk, meat and fish. It must be remembered that such foods as casein and gelatine are incomplete proteins and therefore will not promote growth if they are the principal source of protein.

The deprivation of any of these indispensable amino-acids leads to a vicious circle, as there is a resulting reduction of appetite and decrease of food intake, which still further conspires to the hindrance of growth. This anorexia is the direct result of the tissues not requiring food through the slowing up of growth. These amino-acids cannot be considered as appetizers except through their stimulation of growth and thus the creation of a demand for food.

Another important factor in the promotion of growth is the vitamins. The absence of vitamin *A* does not arrest growth, but causes a reduction in weight. Vitamin B_1 is specific in promoting growth, which ceases with its absence. This deprivation also leads to loss of appetite and atony of the gastro-intestinal tract, bringing about a suppression of secretions and impaired absorption. Vitamin B_2 does not appear to be so specific, although when an animal is fed upon autolysed yeast, which removes it, growth soon ceases in spite of the anti-neuritic factors being added. These vitamins are found in yeast, "Marmite", whole cereals, egg yolk, many vegetables and fruits, and in cheese, milk, kidney and liver. They are not present in important amounts in meat, game or fish.

In addition to these specific foods an adequate supply of minerals, particularly calcium and phosphorus, must be provided. Growing children in good health show a positive balance or retention of calcium. It has been shown that between the third and thirteenth years it is retained in proportion to size or weight in amounts equivalent to 0·01 gramme per kilogram of body weight per day.

It is not enough that they have an adequate supply of calcium, but in addition there must be available vitamin *D*. It is found in highest concentration in cod liver oil, and less so in salmon and egg yolk, and in variable quantities in butter and milk. The ultra-violet component of sunlight and vitamin *D* are interchangeable in some respects. In fact, it may be stated in a simple way that vitamin *D* may be produced by the irradiation with proper

wave-lengths of sterols, and this is what occurs in nature. In other words, ultra-violet rays are necessary directly or indirectly for its production.

These facts have been used in the manufacture of various products, some of which are extremely powerful, and in large amounts are toxic, producing disastrous results and even death. Pure crystalline vitamin *D* has an effective daily dosage of about one-tenth of a milligramme. The difference between vitamin *D* and irradiated ergosterols is best determined by the study of the absorption spectra of solutions of these materials. Vitamin *D* (calciferol) shows a maximum band at 265 millimicrons. If, however, the radiation is too intense or too prolonged, there will be produced a series of substances with maximum absorption spectra below 250 millimicrons, which are definitely toxic and have only a weak antirhachitic effect, which is the important factor in vitamin *D* in so far as growth is concerned. Toxisterol, with a maximum absorption band at 248 millimicrons, is a poisonous substance with no significant antirhachitic power, but is a powerful calcifying agent. It is amusing to speculate whether it could possibly have turned Lot's wife into a pillar of salt. It is through the effect of vitamin *D* on calcium metabolism and the prevention of a negative calcium balance in rickets, osteomalacia, and cœliac or Gee's disease that it prevents the impairment of bone formation and thus influences growth.

Calcium deficiency may occur in spite of vitamin *D* and cause dwarfism, as in renal rickets, when there is a disturbed calcium metabolism with impaired renal function, in starvation from a decreased supply, and during lactation in very young mothers when the loss in the milk is greater than the dietary intake.

Another important factor in growth is physical exercise and training. Carefully controlled experiments have shown that gymnastics increased the growth of cadets by 2·7 centimetres (one inch) over a control group.

We have so far discussed what may be called the growth factors of the external environment. In spite of the fact that these are essential, they would be of little avail unless there were some internal mechanism to carry out and control this important biological function. This rests in the hormones of the endocrine glands. These not only affect the general growth, but also that of specific structures. The rôles of the different glands cannot be separated experimentally as easily as can those of the vitamins, as many have multiple hormones and they comprise an interacting system of a manner so complicated that the tangle has been only partly unravelled. But in spite of this, certain facts stand out in definite relief, and future advances will be made through the increasing knowledge of their chemical constitution and their synthesis. They can then be used in pure form.

Our knowledge of the endocrine glands accumulated slowly, but during the past generation with increasing momentum, until now the pace is startling; the hypotheses of this year may be completely revolutionized next year.

The first suggestion that growth might be influenced by any of the endocrine glands was the observation by Verger in 1864 of a case of acromegaly with an abnormal pituitary gland. Such a striking skeletal change could not help but intrigue medical thought. Klebs, in his monograph on this disease, demonstrated abnormally large pituitaries; but it was for Marie in 1886 to establish definitely the relationship of the syndrome to this gland. He considered it due to a glandular deficiency; although Lorraine in 1871 had described pituitary dwarfs. As our knowledge grew it became more and more apparent that although this gland has specific individual functions, it also influences others, and therefore has been called the "master gland" in the endocrinological system. It is not my purpose to deal with these in detail, but it serves to clarify our thesis if they are briefly mentioned. They are the following:

A. Anterior lobe—
1. Growth hormone.
2. Gonadotropic hormones: (*a*) ovulation, (*b*) luteinization, (*c*) pregnancy protection.
3. Lactogenic hormone.
4. Thyreotropic hormone.
5. Adrenalotropic hormone.
6. Parathyreotropic hormone (not conclusive).
7. Diabeticogenic hormone.

B. Posterior lobe.
1. Pressor effects (elevation of blood pressure).
2. Respiratory effects (changes in depth and rhythm).
3. Oxytocic effects (uterine contraction).
4. Gastric activity (increased tonus and motility).
5. Renal effects (anti-diuretic action).
6. Galactogogue activity (increased milk secretion).
7. Metabolic effects (increased oxygen consumption and hyperglycæmia).
8. Melanophore action (contraction or expansion of melanophores).

It will be noted that certain anatomical changes are produced by the anterior lobe, while the posterior part principally controls functional processes. Therefore, in the present discussion we are concerned with the anterior lobe and particularly its influence in skeletal and organismal growth. But the interrelation of some of these functions cannot be neglected. It has been found that the growth and sex hormones are not cooperative, but mutually inhibitory. In experiments in which the sex and growth hormones in combination are injected into animals, there is not as great an increase in stature as when the latter are given alone. The contrary is corroborated by clinical observations in man. It has further been demonstrated that under adverse conditions the action of the growth and gonadotropic hormones is suppressed in favour of the thyreotropic and adrenotropic hormones. This would appear to be a protective adjustment, stature and fertility being secondary to metabolic activity and stamina.

The influence of the growth hormone of the pituitary can be demonstrated experimentally in animals when the extract is injected. But it is of particular

interest in what manner abnormality of this function affects man. If there is an over-activity of this hormone before the epiphyses have closed, there is an orderly but excessive stature. There is at the same time a tendency for the sexual function to be decreased. This is the usual result found in pituitary giants, and a like combination of results occurs

FIGURE I.
Litter mates. The dog on the right has been treated with growth hormone. (After Evans.)

when the growth hormone is abnormally effective after puberty. Then acromegaly occurs with the classical increase in the size of the head, jaws, thorax, hands and feet with but little or no change in stature. Although at first there may be an increase in sexual development and capacity, this is usually succeeded by a decrease in the latter.

FIGURE II.
Pituitary giant and pituitary dwarf. (Courtesy of Dr. Hector Mortimer.)

Equally important in elucidating the rôle of this growth hormone are the so-called pituitary dwarfs. In these individuals, although the epiphyses do not close, there is a complete arrest of growth with the size and form of a child of ten or twelve. They may live to an old age, and amongst them have been famous characters in history. It is also usual for sexual development to remain juvenile, but this is not always the case, and some have matured and had progeny who grew to normal stature.

In addition to a lack of pituitary hormone, dwarfism may be due to deficient thyreoid function in childhood. This is called cretinism, and may be congenital or acquired. The principal feature of interest to us at the moment is the lack of growth which always occurs. This condition is seldom recognized until it is obvious that the mental development of the child is defective and its growth is arrested. The exact relation to the growth hormone is not clear, as the condition usually responds satisfactorily to therapy with thyreoid gland or extract.

There is another phase of this question which is important. The rate of growth in childhood is fairly

FIGURE III.
A cretin without treatment.

regular, but towards puberty it increases and progresses during the second decade until the epiphyses have closed. There is a general relation between these two events; the earlier the onset of pubescence, the sooner do the epiphyses close and growth ceases. It is during this period that the final stature will be determined. The environment during adolescence is therefore of prime importance in growth.

It will have been noted that the changes in stature which are associated with or result from endocrine deficiencies, are individualistic. This, of course, does not enable us to draw any definite conclusions as to the growth of the general population, either in districts, nations or races. That body size and form have a genetic basis is evident on racial considerations. Thus the negro race is characterized by relatively long legs and are tall, while the Chinese have short legs and stature.

Similarly, extremes of long and stout individuals run in families. Since stature involves many separate factors, it is not surprising that many variations creep in and that hereditary tendencies are difficult to follow. The general rule holds that when both parents are tall the children are also above average height. If but one of the parents is tall the same holds good, indicating that tallness is a dominant trait.

There is abundant evidence to indicate that the general plan of growth directed by internal factors can be modified by external conditions. In short, unfavourable environment may prevent the inherited developmental processes from expressing themselves. Factors that are known to act in this way are an imperfect or deficient blood supply, mechanical factors within the uterus, chemical and toxic agents, excess or deficiency of hormones and infections of the embryo itself. It is well known that there are periods during the development of the embryo which are critical in growth. At the times when organs are being formed by primary lateral budding, metabolism and growth of the cells are at their maximum, hence an optimum environment is required. Unfavourable external conditions at these moments depending upon their intensity may lead to permanent functional and anatomical inferiority. On the other hand, adverse environmental conditions may be tolerated while collateral growths are developing from *Anlagen* already laid down. As the blocking out of organs occurs at different periods, it is understandable how temporary disturbances of environment may modify the structure and function of single organs rather than the body as a whole. Finally, should environmental factors affect the development of important organs of internal secretion, such as the pituitary or the thyreoid, the lack of their hormones might secondarily affect the differentiation and growth of the entire embryo. Particularly would this be so if the maternal blood were deficient in this hormone.

It is not unusual to encounter individuals who since childhood have suffered from severe visceral disease, in whom the normal skeletal and sex development has been retarded or even arrested. I have seen such instances associated with chronic nephritis, chronic rheumatic and congenital heart disease, asthma and hookworm disease. It is by no means constant, but suggests the possibility that growth is a function, like many others, which is dependent upon the general symmetry of organic cooperation and nutrition.

But again we are dealing with individuals. What might happen if an entire tribe or people were in an environment where one or more of the essentials for growth (amino-acids or vitamins) were grossly deficient in their dietary; where the quantity of the food supply was inadequate; where parasitic infestation, such as hookworm disease, was universal; or where sunlight was deficient through the earth's rotation or other factors.

As is common in biological processes, all the eggs are not in one basket. Vitamin *B* and thyroxin both promote growth by stimulating metabolic processes. The amino-acids are essential for tissue construction and therefore for growth, while the pituitary growth hormone probably acts as a stimulant of protein (amino-acid) anabolism. It has been shown by Bryan and Gaiser that these factors are interdependent. Rats on a special growth diet increased in weight from 60 to 200 grammes in 38 days; on the same diet with growth hormone in 28 days; on a poorer diet it took 50 days without and 37 days with the hormone. It has also been shown that although the energy expenditure is increased seventeen times, the animals treated burned more fat and less protein than did the controls, the latter being stored in the form of tissues.

The same essentials, namely, a hormone, vitamins and a proper food supply, are requisite for growth in plants.

Can this accumulated knowledge, both experimental and anthropological, be used for the benefit of the human race? It must not be taken for granted that the taller races are necessarily superior to the shorter either in physical endurance or mental capacity. It has been suggested because they are short in limb and big in torso that small races have through these qualities survived an adverse environment; but this would tacitly acknowledge that such adverse conditions had contributed to this form. We now might ask ourselves whether there are indications today which suggest this possibility. It is difficult to obtain reliable data to elucidate this point. It would be unfair to take, for instance, the population of India and to attempt to apply conclusions to the peoples of Europe, North America and Australasia. Amongst the last mentioned we have a group of nations or peoples who, taking them all in all, came from a conglomeratively uniform common stock, and who have followed a fairly comparative social evolution during the last thousand years.

I shall not bore you with numerous comparisons and figures. I shall deal with certain anthropological measurements made in North America. The principal interest rests on the data of stature of the Civil War soldiers and those of 1917-1918. The former are obtained from records of the Northern armies compiled by Baxter and Gould. These recruits were drawn chiefly from the States north of the Ohio River, but also from Kentucky and West Virginia. The average stature was 171·89 centimetres (67·64 inches). The average height of the recruits in 1917-1918 was 171·4 centimetres (67·49 inches). It might be concluded, then, that the mean stature of men of military age has changed little in the United States of America in the past fifty years. But this would be hasty. The men of 1917-1918 were taken from all parts of the country, while those of 1861-1864 largely excluded the southern States, and since the men of these States are exceptionally tall, their inclusion probably tends to raise the present mean stature. In Table I are compared the average stature of the Northern army recruits by States at these two periods.

TABLE I.

Comparison of Stature (in Inches) of Native and Foreign Born White and Coloured Draft Recruits, United States, 1917–1918, and White Recruits of the Civil War (Gould, Table I, Chapter V), by States in Order of 1917–1918 Average Stature. (Louisiana omitted on account of scanty data in Gould's table.)

State.	Stature.		Difference.
	1917–1918.	1861–1864.	
	Inches.	Inches.	
Minnesota	68·04	67·63	+0·41
Iowa	68·04	68·13	−0·09
Kentucky	68·02	68·16	−0·14
Missouri	67·95	68·03	−0·08
West Virginia	67·87	68·43	−0·56
Indiana	67·75	68·06	−0·31
Wisconsin	67·60	67·65	−0·05
Illinois	67·40	67·97	−0·57
Ohio	67·38	67·84	−0·40
Maine	67·28	68·12	−0·84
Michigan	67·23	67·62	−0·39
Vermont	67·12	67·61	−0·49
Maryland	67·08	67·31	−0·23
New Hampshire	66·97	67·40	−0·43
New Jersey	66·77	66·58	+0·19
Massachusetts	66·76	67·05	−0·29
New York	66·72	67·09	−0·37
Pennsylvania	66·72	67·14	−0·42
Connecticut	66·71	67·09[1]	−0·38
Rhode Island	66·40	67·09[1]	−0·69

[1] Data for Rhode Island and Connecticut consolidated, 67·09.

It will be noted that the average height is slightly less in 1917-1918 than in 1861-1864, except in New Jersey and Minnesota. The average reduction was, however, only 0·749 centimetre (0·295 inch), but the shortest were from the industrial districts of the Atlantic seaboard, and the farther west the taller they were. The extremes were separated by only 1·2 centimetres (0·54 inch).

If we now tabulate the recruits of 1917-1918 by States, which will naturally include all of them, it will reveal the following interesting results.

It will be noted that there are fifteen States that take precedence over Minnesota which contributed the tallest soldiers to the Northern army. The first five are Southern States, and only three (Virginia, South Carolina and Louisiana), which may be truly classified as southern, are in the lower half, while all the States of the Northern armies are in this part except Minnesota, Iowa, Kentucky, Missouri and West Virginia, all of which, but the last, may be properly called Western States. It is well to note that the men of Rhode Island and Connecticut are the shortest at both periods. The tallest men come from States south of the Ohio and west of the Mississippi, where the population is in great part descended from the old American migrants, particularly of the south, immigrants from Scandinavia, and other northern Europeans. In the lower bracket we find the States of the Atlantic seaboard and north-east of the Mississippi. In this group are found States which received and retained to a large extent the immigrants from south-eastern Europe, Italy and Portugal, and Polish Jews and French Canadians, the last three being the shortest of all immigrants. This can be expressed in a different way. The Texans are on the average 2·5 centimetres (one inch) taller than the average American, and 5·0 centimetres (two inches) taller than the average man in Rhode Island. In Texas only 1% of the population is Italian, while in Rhode Island Italians number 8%

TABLE II.

Mean Stature by States, First Million Draft Recruits. States Arranged in Order of Standing, with Proportional Weight and Chest Circumference at Expiration for each Inch of Stature.

State.	Number of Men Measured.	Mean Height.	
		Inches.	Centimetres.
Texas	34,531	68·40	173·74
Oklahoma	19,429	68·28	173·43
Mississippi	8,543	68·27	173·41
Tennessee	14,426	68·27	173·41
Arkansas	10,111	68·20	173·23
Kansas	9,571	68·20	173·23
Alaska	106	68·15	173·10
Colorado	6,635	68·15	173·10
North Carolina	14,668	68·15	173·10
Arizona	3,850	68·13	173·05
Idaho	4,031	68·10	172·97
Oregon	2,748	68·09	172·95
Nebraska	10,774	68·08	172·92
South Dakota	3,892	68·05	172·85
Iowa	19,537	68·04	172·82
Minnesota	27,341	68·04	172·82
Kentucky	15,502	68·02	172·77
Alabama	15,988	68·01	172·75
Montana	11,648	68·01	172·75
Georgia	20,305	67·99	172·69
Washington	13,316	67·96	172·62
Missouri	24,964	67·95	172·59
North Dakota	6,444	67·92	172·52
West Virginia	12,367	67·87	172·39
Utah	4,568	67·85	172·34
Nevada	1,441	67·83	172·29
Virginia	17,616	67·80	172·21
Wyoming	1,927	67·79	172·19
Indiana	23,194	67·75	172·09
California	35,461	67·67	171·88
South Carolina	9,343	67·64	171·81
District of Columbia	4,486	67·63	171·78
Louisiana	12,356	67·60	171·70
Wisconsin	18,433	67·60	171·70
Florida	5,895	67·85	171·65
New Mexico	2,690	67·50	171·45
Illinois	69,491	67·40	171·20
Ohio	52,814	67·40	171·20
Maine	3,315	67·28	170·89
Michigan	41,872	67·23	170·76
Delaware	1,891	67·19	170·66
Vermont	2,077	67·12	170·48
Maryland	9,192	67·08	170·38
New Hampshire	2,240	66·97	170·10
New Jersey	29,958	66·77	169·60
Massachusetts	29,534	66·76	169·57
New York	87,818	66·72	169·47
Pennsylvania	77,186	66·72	169·47
Connecticut	13,585	66·71	169·44
Rhode Island	3,928	66·40	168·66

of the population, the French Canadians 11·4%, and combined Jews and Portuguese 25%.

In a comparison of the stature of the soldiers in Northern armies who were native-born Europeans, we find that they were chiefly drawn from British Canada, Ireland, England and Germany, and comprised 28·6%; while the other foreign-born of average tall races numbered 1·7%, or over 30% in all. The native-born Americans, the tallest of all, comprised 68·2%, only 1·5% being thus recruited from the shorter native-born Europeans. This is shown in Table III.

If we accept the basic conclusion that the soldiers in the Northern army of 1861 and the United States Army of 1917 were of the same average stature, we must seek some explanation of why the number of tall men from many States in the south and west in 1917 did not raise the average in the whole army. It has been pointed out that 98·5% of the Northern soldiers (1861) were native born or of average tall European races. During the succeeding fifty years the immigrants were principally from the southern and eastern European countries and settled in the eastern and northern States of the Union, while the taller northern European immigrants (in smaller numbers) went to the west. Thus these

TABLE III.

Average Stature of Adult Males of Various Nativities in the United States in the Civil War Period (from Baxter, Volume I, page 32).

Nativity.	Number of Men.	Mean Height.	
		Inches.	Centimetres.
United States, Indians	121	67·934	172·55
United States, whites	315,020	67·672	171·89
Norway	2,290	67·467	171·37
Scotland	3,476	67·066	170·35
British America	21,645	67·014	170·22
Sweden	1,190	66·890	169·92
Ireland	50,537	66·741	169·52
Denmark	383	66·648	169·29
Holland	989	66·637	169·26
Hungary	89	66·594	169·12
England	16,196	66·577	169·11
Germany	54,944	66·536	169·00
United States, coloured	25,828	66·531	168·99
Wales	1,104	66·418	168·70
Russia	122	66·393	168·64
Switzerland	1,802	66·381	168·61
West Indies	580	66·307	168·42
France	3,243	66·277	168·34
Poland	171	66·211	168·18
Mexico	91	66·110	167·92
Italy	339	66·000	167·64
South America	79	65·899	167·38
Spain	148	65·635	166·71
Portugal	81	65·432	166·20
Total	501,008	—	—
Total frequency and mean of	—	67·300	170·94

latter with the taller Southerners were counterbalanced on the average over the whole country by the great tide of the former.

But why the excessive stature of the men of the southern and western States? It is true that the dilution of immigrants they received would do little or nothing to reduce it. This, however, does not answer the question, as they were considered tall in 1861 and have remained so, in fact are definitely taller than Scottish and English people from whom they were descended. It could be argued that heredity was the sole factor. Have we any evidence that environment might have played a part? In order to obtain evidence at least to suggest, if not prove this, we must turn to some country where immigration of a shorter race has not occurred. There is one at hand which answers this purpose, namely, Scotland. Here the only immigration of any numbers in the last century has been of the Irish, who are classed with the Scotch and Scandinavians as European people of high average stature. The medical inspection of school children in Glasgow as compared with those of the north of Scotland shows a progressive divergence until at thirteen years the latter are on the average 12·5 centimetres (five inches) taller than the former. Further, the average height of Glasgow labourers examined for army purposes was 155 centimetres (62 inches), while labourers recruited from agricultural and rural districts average 175 centimetres (68·8 inches), or a difference of 20 centimetres (6·8 inches).

It has been amply proven that exercise and physical training up to the twentieth year have a direct influence on stature. Southern and western States and northern Scotland are in the main agricultural and ranching, and the rural population forms a considerable proportion. In the north-eastern group of States the urban population dominates, and manufacturing far overshadows outdoor employment. The cause for conspicuous stature of the southern and western Americans, and here we might include the Australasians, has been summed up most simply as a favourable change of environment, using the term "environment" in the broadest sense.

It is an interesting problem as to whether or not this tendency towards greater height of the body is still present in the Americans. There are good indications that it is still active in the newcomers. This is demonstrated in Table I. Although the average stature of the soldiers of the northern States was 0·73 centimetre (0·295 inch) shorter in 1917 than in 1864, it must be appreciated that the average height of most of the immigrants who settled in these parts was about 5·0 centimetres (two inches) shorter. Therefore the dominant characteristic of relative tallness in the natives had its effect, or environment played a part. There are also data that the average height of the students for the same ages has been increasing in many, if not all, colleges without a marked change in the character of their students as far as age, nativity or class is concerned. This applies to both men and women.

It has been claimed that important factors in promoting the stature of the pioneers in addition to the better housing and outdoor life, were the plentiful supply of food, and especially dairy products and meat, and the absence of stunting child labour.

Is there any evidence to indicate why people of certain countries are shorter than those of other nations? Again heredity may be accused or blamed. But did it start and has it continued as a dominant characteristic? Before accepting this as the only factor it would be necessary at least to make an analysis of the national dietary to ascertain whether this might have some influence. It is the custom in the majority of households for children and adults to partake of the same food. Therefore the average diet of the whole population would apply fairly equally to all ages. This is an important premise, as we have no data on the national food consumption at different age periods. The child is certainly father to the man in growth, if not in all things.

We have already pointed out that the important dietary factors in the promotion of growth are certain amino-acids and vitamin B_1, with vitamin *D* and sunshine to prevent rickets. Therefore a proper diet should contain these, and the following are the principal sources of them.

Amino-Acids.	*Vitamin B_1.*	*Vitamin D.*
Lysine (milk, eggs, meat).	Yeasts.	Sunlight.
	Whole cereals.	Cod liver oil.
Tryptophane (milk, eggs).	Eggs (yolk).	Halibut liver oil.
	Vegetables.	Salmon.
Cystine (wheat).	Milk.	Egg yolk.
Histidine (milk, eggs, wheat).	Cheese.	Butter (variable).
		Milk (variable).

Lean meat, from our present point of view, is a complete protein, but contains principally lysine, which is also present in milk and eggs. This list can be condensed to the following: milk, eggs, cheese, wheat, whole cereals, vegetables, meat, fish and sunlight. If the lack of these foods, either individually or collectively, has any effect on the average stature of a nation, it should be apparent when two extremes are compared. For this purpose I have selected the national consumption of these foodstuffs in Australia and Italy as examples of average high and low stature.

TABLE IV.

Foods. (Per Head per Year.)	Australia.	Italy.
Milk, Butter, Cheese (in liquid milk equivalents)	102 gallons	22 gallons
Eggs	140	115
Wheat	300 lb.	340 lb.
Cereals, Vegetables	No approximate figures available.	
Fresh fruits	107 lb.	38 lb.
Meat	220 lb.	40 lb.

It must be acknowledged that these estimates, taken from the report of the League of Nations on "The Problem of Nutrition", Volume IV, may be open to review:

> It is imperative that they should not be regarded as more than a first and purely tentative essay which further research might cause to be altered in several instances.

While taking this into consideration, the striking differences in the consumption of milk and milk products and meat are, to say the least, significant, as they are amongst the most important dietary elements for growth. It would be of interest to ascertain the differences, if any, in the consumption of these products by the northern and southern Italians, as the former are on the average over two and a half inches taller than the latter (66·8 to 64·3). Personal communications have revealed that dairy products and meat are much more abundantly consumed in the north.

We may, however, approach this problem from another point of view. In recent years there has been considerable migration of Chinese from south China to Hawaii. Several interesting studies have been conducted of the effect of the new environment on these immigrants. It has been found that the yearly increase in stature is more regular for Chinese children in Hawaii and they are taller in adult life, although they are mostly of the first generation in the new land. This increased growth is due partly to sitting height or trunk, but mainly to more rapid increase in the length of the lower limbs, in which height of knee is the more active factor. This difference between boys in Hawaii and in east China strikingly parallels the difference between adult Chinese in Hawaii and Cantonese, and would seem to indicate that it is the result of environmental factors rather than of inborn racial growth, impulse or characteristic. The most important of these factors is undoubtedly dietary—the radical change from the restricted diet of rice to a more varied and growth-promoting *régime* approaching that of the western peoples. This is confirmed by direct experiment. Hsien Wu took four-weeks-old rats with a vegetarian ancestry of ten to eleven generations and placed them on an omnivorous diet. The growth showed marked improvement in the first generation. After one generation on this diet the future generations were comparable with stock omnivorous rats. Similar results have been found with young recruits in a country where the standard diet is strictly vegetarian. The addition of meat produced an increased stature in the first generation as compared with controls.

The truth appears to be that, given a normal pituitary and thyreoid function, with a proper supply of vitamin *B*, amino-acids, ample food supply and physical exercise during the years between five and twenty, the stature of a race may be increased to the optimum of Grecian perfection.

Now I close, expressing the firm belief that the time is at hand when the biblical question: "Which of you by taking thought can add one cubit unto his stature?" may be answered in the affirmative. Man may again rival Hercules and a modern Euripides may sing:

> The wearied Atlas he relieved,
> His arm the starry realms upheaved,
> And propped the gods above.

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THE INCIDENCE OF RHEUMATIC INFECTIONS IN VICTORIA.

By H. BOYD GRAHAM, D.S.O., M.C., M.D.,
Melbourne.

AT the request of Dr. J. Newman Morris, the representative of the British Medical Association on the National Health and Medical Research Council, I have made an attempt, with the assistance of many others, to carry out some sort of a survey of the incidence of rheumatic infections in the State of Victoria, with special reference to their association with heart disease and to the preventive aspect of the subject. It is inevitable that the results of this inquiry will fall short of the requirements of mathematical accuracy because of the incompleteness and unavailability of many of the requisite records, but no effort has been spared to obtain information, the sources of which will be duly acknowledged, and to make allowances and approximations to cover the deficiencies after careful consideration and consultation. It is hoped, therefore, that the results about to be presented will be of some value in the assessment of the magnitude of the problem of cardiac rheumatism in the State and in the determination of the measures to be adopted to cope with it to the best advantage of the unfortunate sufferers and of those who are called upon to care and provide for the large proportion of young medical cripples that this insidious disease leaves in its train.

Mortality Statistics.

The Government Statist, Mr. O. Gawler, provided a tabulation under twenty-one headings (selected as likely to include the deaths of rheumatic subjects) of the numbers of deaths of each sex in age groups for each of the five years 1931 to 1935 inclusive. With the assistance of Dr. Keith D. Fairley and of Dr. Thomas Lowe, separately and in consultation, I culled from this tabulation the figures that I judged could, with reason, be used to form an estimate of the annual number of deaths attributable to rheumatic infection. The average estimate for the period specified was 337 *per annum* attributable to rheumatic infection, of which 179 come under the heading mitral valve, 61 under the heading acute rheumatic fever and only one under chorea. The average annual total number of deaths in the State for the period specified was 17,680 and the average annual rate per thousand of the population was 9·71. On this evidence, which, because of the existing system used in the death certificates, can be based on estimates only, the incidence of rheumatic infections as causes of death is 2·1% of the total deaths and this cause of death is responsible for 204 deaths annually per million of the population. The sexes are affected approximately equally and of the 204 persons who die annually 10 are under ten years, 21 are between ten years and twenty years, 22 between twenty years and thirty years, 23 between thirty years and forty years and 30 between forty years and fifty years per million of the population. Approximately one-half of the deaths are certified directly as due to mitral stenosis, though it is probable that many more deaths from mitral stenosis are certified more vaguely.

The Incidence at the Metropolitan Public Hospitals.

Royal Melbourne Hospital.

Dr. Keith D. Fairley has provided me with detailed information from the Royal Melbourne Hospital covering the period of four and a half years to the end of 1936, arrived at after perusal and scrutiny of the actual histories of the patients included, and Dr. J. H. Bolton, the Medical Superintendent, has supplied data concerning the total admission of in-patients and the total deaths from all causes.

The conclusions arrived at are that 1·23% of the total admissions and 3·42% of the total deaths are attributable to rheumatic infection. The average annual number of patients admitted to hospital with rheumatic infections and associated heart diseases was 95·5 with 28·5 deaths. Rheumatic fever was responsible for 19, chorea for 3·5, and rheumatic heart disease for the remaining 73 patients admitted, and practically all the deaths were due to the involvement of the heart.

Dr. Bolton has constructed a graph which was inspected; it shows a considerable fall in the incidence between 1916 and 1924, but a fairly stationary incidence since then.

The Alfred Hospital.

Dr. W. G. Allen, the Medical Superintendent of the Alfred Hospital, supplied me with detailed lists of patients admitted during the five-year period to the end of 1936 and with the corresponding information concerning total numbers of admissions and of deaths from all causes. From these data, with the assistance of Dr. Thomas Lowe, I have arrived at certain conclusions. Of the total admissions 1·08% and of the total deaths 2·07% are ascribable to rheumatic infection. The average annual number of patients admitted to hospital with rheumatic conditions is 67·8 with 11·6 deaths; 15·4 of the patients were admitted with rheumatic fever, one with chorea and 51·4 with rheumatic heart disease and practically all of the deaths were due to cardiac involvement.

Saint Vincent's Hospital.

Dr. Eric Cooper and Dr. H. L. Brewer, the Medical Superintendent of Saint Vincent's Hospital, have compiled carefully the information from this source bearing on the subject under consideration; from this information which covers the six-year period to the end of June, 1936, it appears that 2·03% of the total admissions and 3·17% of the deaths at this general hospital are due to cardiac rheumatism. The average annual number of patients admitted with rheumatic infection was 64·6, made up of 19 patients with rheumatic fever, 2·8 with chorea and 42·8 with heart conditions. The average annual number of deaths of these patients was 9·5, from the cardiac complications and sequelæ.

Prince Henry's (formerly Homœopathic) Hospital.

Dr. R. C. Alexander, the Medical Superintendent of Prince Henry's Hospital, provided a detailed list with requisite particulars of patients admitted to this general hospital with rheumatic infection, together with information concerning total admissions and total deaths for the five-year period to the end of 1936. Of the total admissions 0·76% and of the total deaths 0·73% are due to rheumatic infection. The average annual number of patients admitted with this infection is 18·1 with 1·0 death. These patients comprise 12·1 with rheumatic fever, 1·4 with chorea and 4·6 with cardiac complications and sequelæ. The small proportion of patients with sequelæ is held to account for the lower admission and death rate at this hospital.

Queen Victoria Hospital.

Dr. Alice Correll, the Medical Superintendent of Queen Victoria Hospital, has supplied the information required from this general hospital for women and female children, but admissions to the midwifery wards have been excluded for the present purpose. The admissions for rheumatic infection represent 0·57% of the admissions for all causes to the remaining wards and the rheumatic deaths are 1·45% of the total deaths in these wards; 5·6 patients with rheumatic infection were admitted annually during the five-year period to the end of 1936; they comprised 1·6 with rheumatic fever, 0·6 with chorea and 3·4 with cardiac complications. The average annual number of deaths was 0·6, representing 1·45% of the total deaths from all causes in these wards. Only six rheumatic patients in five years were under the age of fourteen years.

Special Hospitals.

The Children's Hospital records will be considered separately because they cannot be compared fairly with those of the general hospitals. Dr H. O. Johnston, the Medical Superintendent of the Austin Hospital for Chronic Diseases, has informed the Chief Health Officer that the information required is impossible to assess. Most of the patients are referred from elsewhere on account of cancer and tuberculosis. The Queen's Memorial Infectious Diseases Hospital is for patients suffering from the acute infectious diseases and no information has been obtained from it or from the Eye and Ear Hospital or from sanatoria and convalescent hospitals because the information was not likely to be of value to the survey. This applies also to the Women's Hospital.

Summary of Above.

As may be seen in Table I, the average annual total number of admissions to the five general hospitals is 20,437 with 1,771 deaths, including 251·6 patients with rheumatic infections with 51·2 deaths. Of the total admissions 1·23% and of the total deaths 2·03% may be ascribed to rheumatic infec-

TABLE I.

Rheumatic Fever, Chorea and Cardiac Rheumatism at the General Hospitals. Recent Average Annual Figures.

Hospital.	Admissions for Rheumatic Fever.	Admissions for Chorea.	Admissions for Cardiac Rheumatism.	Total Rheumatic Admissions.	Total Admissions (All Causes).	Percentage Rheumatic Admissions.	Total Rheumatic Deaths.	Total Deaths (All Causes).	Percentage Rheumatic Deaths.
Royal Melbourne	19·0	3·5	73·0	95·5	7,743	1·23	28·5	833	3·42
Alfred	15·4	1·0	51·4	67·8	6,156	1·08	11·6	560	2·07
Saint Vincent's	19·0	2·8	42·8	64·6	3,191	2·03	9·5	300	3·17
Prince Henry's	12·1	1·4	4·6	18·1	2,370	0·76	1·0	137	0·73
Queen Victoria	1·6	0·6	3·4	5·6	977	0·57	0·6	41	1·45
Totals	67·1	9·3	175·2	251·6	20,437	1·23	51·2	1,771	2·03

tion. The 251·6 patients comprise 67·1 with rheumatic fever, 9·3 with chorea and 175·2 with cardiac complications and sequelæ. The cardiac conditions are responsible for practically all of the deaths. The rheumatic fever patients outnumber those with chorea in the proportion of seven to one and the patients presenting themselves for admission with heart conditions, consequent upon earlier infection untreated or treated elsewhere than at the general hospitals, are more than twice as numerous as those admitted with rheumatic fever and chorea combined.

Of the patients admitted to hospital with heart complications and sequelæ, 29·2% die in hospital, many are transferred to convalescent and after-care homes and often to country hospitals, such as those at Bendigo, Castlemaine, Maldon, Kyneton, Beechworth and Sale, and some die in these places.

Information from the Children's Hospital, Melbourne.

The key to the situation in the State is the Children's Hospital, because a very high proportion of all the patients who are afflicted with rheumatic fever and chorea and cardiac involvement in the early phases pass through its wards. Dr. Thomas Lowe and Dr. Stanley Williams have assisted greatly in the careful collection from the case histories and the hospital records of much of the information to follow.

The Incidence of Rheumatic Infection.

The average annual number of admissions to the hospital for all causes for the five-year period to the end of 1936 was 4,625 with 515 deaths. During the same period the average annual number of children admitted with rheumatic fever was 87·6, and with chorea was 28·2. Only twelve children were admitted both for rheumatic fever and for chorea in five years, though thirty-four had at some time been admitted for both and had been admitted for the one condition or the other during the five-year period under review. Of 129 patients with chorea only, 18 were readmitted in all twenty-five times. Of the 34 patients who had had both chorea and rheumatism, 12 were readmitted in all eighteen times. Of 404 patients admitted with rheumatic fever only, 63 were readmitted in all 77 times. Three of the children with chorea and 41 of those with rheumatic fever died in hospital in five years. The average annual number of deaths was 8·8, being 1·71 of the total deaths. The number of patients admitted with rheumatic infection represents 2·50% of the total admissions from all causes. It was found impossible to discriminate between readmissions with exacerbations of rheumatic fever and with heart complications only. Of the 567 children under consideration, the heart was noted not to be involved in 78 with chorea, in 12 with rheumatic fever and in 2 with both, a total of 92 children; it was noted not to be involved seriously in 46 with chorea, in 183 with rheumatic fever and in 9 with both, a total of 238 children; and it was noted to be involved seriously in 5 with chorea, in 209 with rheumatic fever and in 23 with both, a total of 237 children. There was a general tendency at later admissions for the serious involvement to become manifest, so that it can be predicted that many of those now in the second group will enter the third group in the years to follow, either at the Children's Hospital or at the general hospitals where they will be admitted under a caption indicative of cardiac rheumatic infection. For this reason, if for no other, it would seem desirable to label the condition as rheumatic heart disease from the outset, with or without chorea, instead of persisting with the term rheumatic fever. The emphasis thus laid on the involvement of the heart would, it is believed, make parents and clinicians more attentive to the necessity for rest and graduated return to normal activities after the initial and any recurrent attacks. A further advantage of the proposed standardization in nomenclature would be the separation in hospital records of rheumatic heart disease from arthritis, often referred to as rheumatoid arthritis or rheumatism in which there is little if any cardiac involvement.

Autopsy Records.

Dr. Reginald Webster, Pathologist to the Children's Hospital, has examined the autopsy records for twenty years to the end of 1935, a total of 3,642 autopsies, of which 109 or 3% show the cause of death to be rheumatic heart disease; 59 boys and 50 girls were the subjects of these autopsies. Fourteen were admitted to hospital with chorea and 11 of these had severe heart lesions and 3 died of exhaustion, 1 with purpura. The average age at death was between 10 and 10½ years. Chorea was associated with pancarditis, 2 cases; endopericarditis, 2 cases; ulcerative endocarditis, endocarditis, 4 cases; carditis and myocarditis.

The average age at death of the 95 subjects of rheumatic heart disease without chorea was between 7½ and 8 years; 71 were under ten years of age. The lesions noted were: pancarditis, 31; endopericarditis, 16; pericarditis, pancarditis with subacute bacterial endocarditis, subacute bacterial endocarditis, 3; ulcerative endocarditis, 2; endocarditis with septicæmia, carditis, 8; endocarditis, 23; endocarditis with nephritis, with purpura, and with pneumonia, and myocarditis, 6.

Economic Class of Children with Rheumatic Infection.

Miss Watson, the out-patients' officer, supplied data which when analysed show that 67% of the children in attendance in the out-patients' department belong to the lowest class, the parents being on sustenance or almost unemployed; 20% belong to the middle class, the parents being on the basic wage; and 13% to the better class parents with three or four children and in receipt of about four pounds per week. Wards of State and children from other institutions were not numerous, approximately 4% of the total, and were excluded. Miss Hodge, the almoner, supplied unselected information concerning the home conditions of 167 rheumatic children

in attendance in the out-patients' department during the past two years; 25% belonged to the lowest class, 50% to the middle class and 25% to the better class. Thirty-seven children, wards of State or institutional, were excluded, but it is noteworthy that they comprise so large a proportion of the total number. Mr. L. Chapman, Under Secretary, has informed me that my request to the Chief Secretary for certain information relative to the incidence of rheumatic complaints amongst wards of the Children's Welfare Department will receive consideration.

Location of the Homes of Rheumatic Children.

An analysis has been made of the addresses of 824 children under the age of fourteen years admitted, during the five-year period to the end of 1936, to the Children's Hospital, the Alfred Hospital and Prince Henry's Hospital. Only 71 of the addresses are outside the Melbourne and suburban postal districts. Arranged alphabetically, they are: Beaconsfield, Beaufort, Berwick, Bunyip, Campbellfield, Clayton, Croydon, Dandenong, 3; Digger's Rest, 2; Donald, Enid, Epping, Emerald, 3; Ferntree Gully, Foxhow, Geelong, Kinglake, Koo-wee-rup, 2; Korumburra, Lilydale, Macedon, 2; Malmsbury, Maryborough, Mitcham, 3; Monbulk, 2; Murchison, Murrumbeena, 5; Navarre, Noble Park, 7; Pakenham, 3; Queenscliff, Seaholme, Seymour, 2; Springvale, 2; Sunbury, Trentham, 2; Tullamarine, Wandin, 2; Warburton, Werribee, Whittlesea, 2; Yarra Glen and Yea.

The addresses in the metropolitan area are in Brunswick (73 cases, population 54,359); Carlton, 61; Melbourne, 2; East Melbourne, 3; West Melbourne, 12; North Melbourne, 26; Parkville, 6; Royal Park, 3; Kensington, 14; Flemington, 2 (129 cases in Melbourne Municipal District, population 103,775); South Melbourne, 17; Albert Park, 8; Middle Park, 3 (28 cases in South Melbourne, population 43,000); Port Melbourne (12 cases, population 13,000); Ormond, 1; Elsternwick, 5; Elwood, 6; Balaclava, 1; St. Kilda, 7; (20 cases, population 46,808); South Yarra, 12; Hawksburn, 2; Windsor, 7; Prahran, 8 (29 cases, population 53,035); Burnley, 6; Richmond, 41 (47 cases, population 38,932); Abbotsford, 3; Clifton Hill, 15; Collingwood, 29 (47 cases, population 29,379); Fitzroy (44 cases, population 30,936); Northcote, 21; Dennis, 1; Croxton, 5; Thornbury, 3 (30 cases, population 41,504); Preston, 26; reservoir, 5 (31 cases, population 32,175); Coburg, 30; Moreland, 5; Fawkner, 4 (29 cases, population 39,055); Ascot Vale, 13; Maribyrnong, 3; Moonee Ponds, 20; Essendon, 11; Pascoe Vale, 5; Glenroy, 2 (54 cases, population 44,127); Footscray, 44; Maidstone, 1; St. Albans, 2; Yarraville, 11; Seddon, 1; Spotswood, 1; Newport, 5 (65 cases, population 50,496); Braybrook, 1; Sunshine, 2 (3 cases, population 9,550); Altona, 1; Williamstown, 2 (3 cases, population 22,330—there is a public hospital at Williamstown to which others may have gone); Fairfield, 1; Alphington, 2; Ivanhoe, none; Heidelberg, 2; Rosanna, 1; Greensborough, 1; Eltham, 2 (population of Fairfield and Ivanhoe Wards of Heidelberg is 27,780); Kew, 8 (26,258); Auburn, 2; Hawthorn, 3; Glenferrie, 1 (6 cases, population 34,229); Armadale, 3; Toorak, 3; Malvern, 9; Glen Iris, 1 (16 cases, population 44,916); Gardenvale, 1; Glenhuntly, 1; Carnegie, 4; Caulfield, 5 (11 cases, population 77,741—no other public hospital); Balwyn, 2; Canterbury, 4; Burwood, 1; Camberwell, 5 (12 cases, population 51,517—no other public hospital); Blackburn, 3; Surrey Hills, 6; Box Hill, 3 (12 cases, population 15,320); Oakleigh, 12 (population 12,050); Murrumbeena, 5; Clayton, 1; Springvale, 2; Noble Park, 7; Dandenong, 3; Mitcham, 3 (total 21 cases, just outside suburban postal districts, population difficult to specify); Bentleigh, 3; Brighton, 9; McKinnon, 1; Hampton, 3 (16 cases, population 30,989); Sandringham, 2; Black Rock, 4 (6 cases, population 18,195); there were no addresses in the remainder of the suburban postal district area except one in Chelsea (population 7,000).

TABLE II.

Addresses in the Municipal Districts of the Metropolitan Area of 753 Children under Fourteen Years admitted to certain Public Hospitals, with Rheumatic Heart Disease and/or Chorea, in Five Years to the end of 1936.

Municipal District.	Population.	Number of Addresses.	Rate per Thousand.
Box Hill	15,320	12	0·78
Braybrook	9,550	3	0·31
Brighton	30,989	16	0·52
Brunswick	54,359	73	1·34
Camberwell	51,517	12	0·23
Caulfield	77,741	11	0·14
Chelsea	7,000	1	0·14
Coburg	39,055	29	0·74
Collingwood	29,379	47	1·60
Essendon	44,127	54	1·22
Fitzroy	30,936	44	1·42
Footscray	50,496	65	1·29
Hawthorn	34,229	6	0·18
Heidelberg	27,780 (part)	9	0·32
Kew	26,258	8	0·30
Malvern	44,916	16	0·36
Melbourne	103,775	129	1·24
Moorabbin	19,100	0	—
Mordialloc	9,864	0	—
Northcote	41,504	30	0·72
Oakleigh	12,050	12	1·00
Port Melbourne	13,100	12	0·92
Prahran	53,035	29	0·55
Preston	32,175	31	0·96
Richmond	38,932	47	1·27
Sandringham	18,195	6	0·33
South Melbourne	43,000	28	0·65
St. Kilda	46,808	20	0·43
Williamstown	22,330	3	0·13
Melbourne and Suburbs	1,027,520	753	0·73

The distribution of these addresses is densest in the inner suburbs and those in which low-wage earners live (approximately one per thousand in five years) and are least numerous in the better residential areas (approximately one per three thousand in five years).

The Seasonal Incidence.

There is not any pronounced seasonal incidence in the admissions. The figures for each month are: Admissions in January, 33; February, 33; March, 43; April, 72; May, 51; June, 50; July, 74; August, 49; September, 52; October, 55; November, 45; and December, 41 (average 50).

Clinical Impressions.

The clinical impressions of experienced members of the honorary medical staff of the Children's Hospital are of great importance to a full appreciation of this subject because of the relative unavailability of clinical material elsewhere in the State. Dr. R. L. Forsyth has been connected with the hospital for thirty-three years, except when abroad, and for twenty-seven years has practised in Surrey Hills. He states that he has not met acute rheumatic fever in the first attack in his private practice more frequently than once in two years, and that in only one case has the child been normally well fed and well cared for as a member of a family in moderately comfortable circumstances. The other children have been below the average in food, dwelling and clothes. Dr. A. P. Derham has been connected with the hospital for eighteen years and has had considerable experience of general practice in an industrial area with a large poor-class population (Preston) and in a good residential area (Kew) and in the eastern and south-eastern suburbs. His impressions definitely convey an appreciation of the same contrast between the poor-class patients who get rheumatic fever and the better class people who escape because they are well clothed, housed and fed and are able to take frequent and adequate holidays and suitable recreation. Dr. Derham has also drawn attention to the possible value of the administration of sodium salicylate to patients with tonsillitis as a preventive measure and to the fact that, through thoughtlessness or want of knowledge, even the children of people who can afford the necessities may be deprived of them and suffer accordingly. Over-indulgence and capricious appetite account at times for improper feeding quite independently of the economic position.

We are in agreement also with Dr. Robert Southby, who has always considered rheumatic disease as one of the most disabling of children's ailments, and who puts in an eloquent plea for more adequate facilities for the treatment of these medical cripples in a special hospital and in special clinics for unremitting observation and after-care.

A system has been in operation since July, 1934, in the out-patients' department of the hospital by means of which each rheumatic child is seen by the almoner before and after each surgery attendance, specified entries are made on a special record chart by the physician who examines the child, and information is communicated to the almoner about progress and future attendance, and by the almoner about home conditions and home visits and any special circumstances or requirements. The establishment of this system has been a real advance, but it is cumbersome, and the lack of a special hospital of the Carshalton type, suitable holiday homes and a special clinic to avoid dispersion of continuity of treatment militate against greater success. More cooperation in detail is needed between the hospitals at which the patient is treated originally and at which later treatment is carried on. This might be obtained if a central bureau was established to collect information and carry out social service visitations.

Incidence in Country Hospitals.

The Medical Secretary of the Victorian Branch of the British Medical Association sent a *questionnaire* to each of the ten base hospitals and thirty-nine district hospitals with public beds to ascertain, for the five-year period to the end of 1936, the total number of admissions to hospital of patients with all diseases and of patients with rheumatic fever, chorea and rheumatic heart disease with and without a previous history of rheumatic fever or chorea, together with the number of deaths from rheumatic affections. The small number of replies received was disappointing. They indicate that in many of these hospitals insufficient records are kept. In Table III the information received has been recorded in the form of average annual numbers.

The information is so meagre that it is scarcely permissible to use it, even to indicate that the incidence is lower in these country hospitals than it is in the metropolis. Two deaths at Kyneton and one at Ouyen in the five-year period were all the deaths reported from this group of hospitals. The total annual admissions for rheumatic affections is slightly in excess of forty. An estimate for the thirty-nine hospitals, on the basis of these meagre data, would be approximately two hundred admissions for rheumatic infection annually.

Sir James Barrett, the Honorary Secretary of the Central Council of the Victorian Bush Nursing Association, sent out a circular letter to approximately forty bush nursing hospitals to obtain the

TABLE III.

Incidence of Rheumatic Affections at certain Country Hospitals. Average Annual Number of Admissions.

Hospital.	Number of Patients with Rheumatic Fever.	Admissions with—		Total Rheumatic Patients Admitted.	Total Admissions (All Causes).	Ratio.
		Chorea.	Rheumatic Heart.			
Geelong	17·0	0·5	Unknown	17·5 *plus*	2,694	?
Hamilton	3·4	0·2	Unknown.	3·6 *plus*	1,045	?
Creswick	1·6	0·8	0·8	3·2	251	1·3%
Kyneton	3·4	0·6	0·2	4·2	360	1·2%
Manangatang	1·0	?	?	1·0 *plus*	191	?
Ouyen	4·4	Nil	2·4	6·6	366	1·8%
Stawell	?	?	?	1·2 approximately	510	?
Woods Point	?	?	?	1·8 approximately	73	?

total number and proportion of admissions and facts concerning rheumatic heart disease. It would appear from the replies received that these patients are chiefly private patients of individual doctors and the information will be included in the next section.

Incidence in Private Medical Practices.

Dr. E. Robertson, Chief Health Officer of Victoria, just prior to his retirement, circularized the members of the medical profession to obtain facts relative to the prevalence of rheumatic conditions and invited comments on causative factors, end-results and desirable preventive measures.

A sprinkling of replies was received from all over the State, but the only safe conclusion that can be advanced is that practitioners, as a whole, do not on an average see more than one new rheumatic patient per year and the probability is that more than half of those seen are sent to public hospitals. It is also probable that there is not much local variation in incidence, with the exception of the suburbs in which there is a high proportion of low-wage earners. Dr. C. H. Dickson, the Medical Secretary, has informed me that the approximate number of practising members of the British Medical Association, Victorian Branch, is 1,320, consisting of 220 practising in Collins Street only (who seldom see any patients with rheumatic disease except in consultation or at public hospitals), 730 practising in the Melbourne and suburban postal districts and 370 practising in the country districts and outside of the metropolis. The number of practitioners who are not members of the British Medical Association is very small and for our present purpose may be disregarded. Allowing one new rheumatic patient every two years for the suburban practitioners and one annually for country practitioners we may estimate that there are not more than 735 rheumatic patients annually who are treated in their own homes or in private or bush nursing hospitals.

Summary.

In an attempt to estimate the incidence of rheumatic fever, of chorea and of rheumatic heart disease on ascertained facts and conjectures bearing on where the patients are treated, I have stated that 252 are treated at five metropolitan general hospitals annually (see Table I) and 116 at the Children's Hospital, Melbourne. In addition it is estimated that approximately 200 are treated each year in country hospitals and 735 in private practices. The total estimate on these figures is 1,303 *per annum* for the whole of the State. As the population of the State is 1,852,171, this represents a rate of 0·70‰ of the population *per annum* who come under medical care for rheumatic infection. Of these approximately three-fifths apply for treatment for exacerbations of cardiac complications and two-fifths for acute rheumatic fever or chorea. Approximately seven have acute rheumatic fever for each one who has chorea. On this basis, the rate of those who are in need of hospitalization for rheumatic fever is 0·245‰, for chorea the rate is 0·035‰ and for heart complications 0·42‰ *per annum*. It has not been found possible to calculate accurately the average duration of life from the first attack to death, but this period would be approximately fifteen years. On this assumption 1·05% of the population of Victoria have cardiac rheumatism, or approximately 19,447 people. It is probable that this is an over-estimate of the number affected if the information gathered from the mortality statistics is not an under-estimate, because at the rate of three hundred and seventy-three deaths *per annum* it would take fifty-two years for them all to die. It seems impossible to decide in which direction the main error lies, but it is probable that the estimated rate of incidence is somewhat too high and that the estimate of deaths is somewhat too low.

Other Sources of Information.

Two large insurance companies were approached in an attempt to obtain some facts from the personal statements of proponents for life assurance. It was thought that the answers to the questions in which the proponents are asked to state whether they have ever had rheumatic fever would form a fair basis for the assessment of the incidence of rheumatic fever in the insurable class of the community. I was informed that no statistics of the nature sought were kept and that to obtain the information required would entail the examination of very many thousand sets of papers by experienced officers. The manager of one society regretted that it was not possible to supply the desired information, but the general manager of the other society has promised to have an investigation made soon.

Dr. Jane S. Greig, Chief Medical Inspector of the State Education Department, has supplied a return showing the incidence of "Organic Hearts" found at the routine school medical inspections, for seven annual periods to June 30, 1936. "Organic Hearts" were found in 0·432% of 319,124 examinations. The percentage was 0·446 for 285,992 children in the elementary schools and 0·309 for 33,132 children in attendance at high schools, and was a little higher for girls than for boys. Dr. Greig explained that the term "Organic Hearts" included "congenital heart conditions" and all other cardiac lesions. It is of interest to compare the similar statistics supplied to Dr. Kempson Maddox by the Principal Medical Officer, Department of Education, New South Wales. In six years 1,164 children were notified for "Heart Conditions" out of 305,009 examined, that is, 0·381%.

Suggestions for Reduction of the Incidence.

The Minister for Health of the Commonwealth of Australia, the Right Honourable W. M. Hughes, in opening the proceedings of the first session of the National Health and Medical Research Council on February 1, 1937, at Hobart, Tasmania, said:

One thing is certain, Australia cannot afford to have so many sick people. Whatever needs to be done—whether by adjustments of the economic system or in any other way—to raise the tone of public health, must be done. I do most earnestly ask the Council to speak very plainly on this vitally important matter.

At the first session, after deliberation, it was resolved that rheumatic infections and heart diseases be made a major subject for consideration at the next meeting.

The view taken throughout the world at present of the causation of rheumatic infections is that because of certain environmental conditions, such as poor dietary, over-crowding and unsatisfactory housing, certain germs of the family of streptococci are able to overcome the resistance to this infection of certain people, especially children and young people. A general disturbance of health takes place with feverishness and pains and aches, especially in the muscles and fibrous sheaths and surfaces of the body and limbs. The heart muscle and its inner and outer coverings and valves are rarely excepted and residual damage occurs frequently which leads to loss of efficiency of the heart's action and further ill-health. Many deaths occur in childhood and many more result in each decade; most of the deaths take place before the age of fifty years. Many of those who do not die young are incapacitated and crippled. They are either unemployable or must accept light work on low wages. Others who obtain good positions are liable to break down in health and receive pensions after retirement or to die prematurely, leaving families who have no adequate provision made for them. In money alone this infection is a great expense to the community. Payment must be made for absence from work owing to sickness, for invalid pensions and pensions to widows, for the support of children who have to become wards of the State and for the cost of maintenance and treatment in public hospitals and convalescent homes. In view of the small population of Australia and the low and falling birth-rate, the problem is of great national importance.

The class of people most seriously affected is the class on the basic wage; many of these people cannot afford both good food and good homes. The arrival of the first baby jeopardizes the time-payment furniture; when the next child comes old clothes must do and the parents must reduce the expenditure on food. By the time the third child comes it is almost impossible for the housewife to make ends meet and the spectres of debt, unemployment and cost of illness are ever present. A time comes when it is more profitable to be unemployed; there are then two adults to look after the children, and less food will keep illness away if hard manual work is not required and the family income rises with each additional child. These facts are applicable with even more force to the bread-winner in casual employment or on day-labour at the basic wage. The assistance of the State is not sought until the position is desperate. These people underfeed themselves and their children and live in most undesirable houses on the lowest possible rent, rather than own that they cannot maintain their independence and retain their self-respect. Shocking as these statements may be to affluent folk, to politicians and to leaders of industry, they are true on the testimony of an unbiased medical man who has diligently inquired for the facts from the mothers and fathers of children in attendance at the Children's Hospital and elsewhere.

For a real reduction of the incidence of rheumatic infections and heart diseases some definite steps must be taken on a nation-wide basis to tackle the problem of poverty. The Right Honourable W. M. Hughes himself was the signatory for Australia to the Declaration of the Rights of Children at Geneva in September, 1925, in which is set out, *inter alia*, that children have the right "to be fed and cared for in health and disease". We are under an international obligation to implement that declaration. An even stronger argument is that unquestionably it would pay us to do so both financially and to retain and improve our position amongst the nations of the world. It has occurred to many that the free distribution of food to all would be possible in this country. A semi-governmental department could be set up in each State (i) to coordinate the primary production of food, (ii) to seek and make use of expert advice concerning the desirable quantities and qualities of food and the instruction of all housewives in the most economical methods of preparation of the food, and (iii) to arrange for the distribution of the food to householders. Those who wanted and could afford food luxuries should be able to buy them, but all should get the ration as a right and not a dole. The increase in the "unemployment" tax that would be necessary would be counterbalanced by the saving on private purchase of food. All would be well fed and could be expected to want to work and to house their families suitably.

The housing question is being faced courageously in Great Britain. Since 1919 over seven hundred million pounds have been spent on subsidized housing, of which two-thirds have been expended by the local authorities and one-third by private enterprise. A national standard of over-crowding has been established in the *Housing Act*, 1935:

In future a house is deemed to be over-crowded if it is necessary for any two persons over ten years of age and of opposite sex (not being spouses) to sleep in one room; or alternatively, if it is inhabited by more than the permitted number of persons as set out in the Act.

These English standards at least should be adopted in Australia in an attempt to reduce ill-health arising from over-crowding.

A general measure that would be helpful in this State would be some form of child endowment, as enjoyed in some of the other States of the Commonwealth. Low-wage earners should be assisted to support their children. The charge is not a fair one if it has to be carried directly by industry, which employs the wage-earner only irrespective of his family. It would not be right to include any child

allowance in the basic wage, for it acts against the employment of the married man in direct proportion to the number of dependants and so defeats its object by swelling the ranks of the unemployed and their dependants who have to receive sustenance doles. Any payment in respect of children should be sufficient to buy the essentials and should not be a contemptible amount.

The reduction of the incidence of the complications of rheumatic heart disease and of rheumatic chorea is a totally different matter from the reduction of the incidence of rheumatic infections in general. It is certain that the present system is unsatisfactory. The infections are prone to occur during childhood and to be treated largely in the Children's Hospital or in the children's wards of certain other public hospitals. The complications of a serious nature are treated largely by a different set of medical men in the general hospitals. The previous history is seldom obtained from the sources where it is available and the further course is often unknown to those who have treated the initial stages. Some coordination is required and a definite "follow-up" scheme should be adopted. It is suggested that registration at a central bureau is feasible, as so many of the patients attend public hospitals. At the central bureau dossiers should be kept of the circumstances of the illnesses of the patients and by almonry and professional social service workers the environmental details should be ascertained and assistance given to remedy defects. The central bureau should issue forms with pertinent questions about the details of the illness, to be completed at the time of the illness by the medical practitioner in attendance and returned to the bureau as the record of the illness. This information could be made available to the next practitioner in attendance on the same patient. The size of the chambers of the heart is of great value in prognosis and treatment. The most reliable way of determining it is by radiography with a special technique of exposure. Films of this description should be added to the dossier. It might even be possible to secure them at stated intervals, say every six or twelve months, if an X ray plant was available for the medical officer in charge of the bureau, whose duties should include some clinical work in connexion with the "follow-up" after the style of that done at the Tuberculosis Bureau. Electrocardiographic records should also be obtained and compared periodically.

The question of observation and treatment centres requires special consideration. The segregation of patients with certain illnesses is proceeding apace, with the result that the general physician is losing more and more of the material on which he can base his general experience and which he can use for the education of medical students. It is already difficult for many individuals to see the whole of the picture of the rheumatic infections. Many of us remember the personal efforts of men like Dr. Hume Turnbull and Dr. A. E. Rowden White, who were in the habit of bringing their students from the hospitals for adults to the Children's Hospital to show them rheumatic patients with florid chorea and pericarditis on account of the rarity of these important features of the disease at the general hospitals. It would be a step in the right direction if a special investigation by experienced teaching physicians could be carried out with the object of making recommendations about observation and treatment centres and a special rheumatic convalescent hospital in Victoria for children and adolescents. These institutions are of proved value in England and should be established here.

It is not my purpose in this paper to go into clinical details of treatment, but it may be helpful to place one further fact on record. Dr. Thomas Lowe has attempted to follow the progress of the children admitted with rheumatic heart disease ten years ago at the Children's Hospital and has found that the information available is almost useless because of the spasmodic nature of the attendances of the children in the out-patient clinics. Very few of them can be followed for two years, and, at times, as long as three years have elapsed between visits, even when the trail can be picked up again. By contrast, he has informed me that 85% of the children whose special cards and visits are now the responsibility of the almoners, are attending regularly and consecutive progress notes are accumulating. These facts encourage me in the belief that special efforts at the public hospitals, kept active and coordinated by a central bureau having the assistance of almoners and skilled social service workers, will enable medical practitioners to minimize the invalidity by taking the proper measures to secure rest for the hearts of patients whenever signs of activity of infection or of loss of efficiency of the heart's action are threatening.

In conclusion, it is evident from the foregoing that drastic action, well directed and sustained at some sacrifice of vested interests, will be necessary if we are to stand behind the Minister for Health and the governmental bodies who have expressed their determination to grapple with this important subject.

Acknowledgements.

In addition to those named in the body of this paper I should like to acknowledge the assistance of Dr. H. N. Featonby, the present Chief Health Officer of Victoria, the encouragement of Dr. Charles Kellaway, Director of the Hall Research Institute, who lent me the papers of the inquiry into this subject made by the Institute and reported in THE MEDICAL JOURNAL OF AUSTRALIA of June 8, 1935, by Dr. Eric Cooper, and the courtesy of all those private practitioners who replied to the circular letters. The many clerks and typists who have been called upon to do their share of work for this survey are also thanked. Permission to use the records was granted by the honorary medical staffs of the public hospitals.

SOME PRINCIPLES IN THE MANAGEMENT OF URETHRAL STRICTURE.

By M. GRAHAM SUTTON, F.R.C.S. (Edin.),
Brisbane.

So that the principles I shall set forth may be the more intelligible, a word or two on the ætiology of stricture will not be out of place. Strictures may be congenital, traumatic or inflammatory in origin. The only congenital stricture worthy of notice is stricture of the meatus and narrowing or partial stricture of the proximal end of the *fossa navicularis*. Traumatic stricture occurs in the perineal urethra, that is, just distal to or just proximal to the *compressor urethræ* muscle, and is due to a fall astride of a hard object or to fracture of the pelvis.

Inflammatory stricture may be said always to be the result of gonorrhœa and its site is most commonly the distal end of the bulb, though many strictures form at its proximal end and not a few in the pendulous portion of the urethra. Stricture in the true prostatic urethra does not occur as such, and we are not considering stricture or contracture of the first part of the urethra or vesical neck, so-called. From the *compressor urethræ* muscle outwards, however, the urethra as regards stricture formation is nothing short of the two ends and the middle of a knotty problem.

One may define organic stricture as a narrowing at some portion or portions of the urethral canal in consequence of either (*a*) round cell infiltration (soft stricture) or (*b*) the contraction of newly formed fibrous tissue (hard stricture) underneath the mucous membrane; and the pathology of gonorrhœal urethritis will explain how this comes about.

Having gained a foothold, the gonococcal invasion may extend in either of two ways, along the upper layers of the mucosa or into the deeper layers through the ducts of the glands of Littré, thus involving the submucous connective tissue and possibly the other strictures of the penis, namely, the *corpus spongiosum* and the *corpora cavernosa*.

The picture then becomes one of any pyogenic infection—œdema, vascular changes with leucocytic emigration *et cetera*, with pus formation and the usual train of symptoms.

The severity of the attack depends upon the virulence of the organism, the resistance of the patient, and the previous attacks and their treatment, and has a great bearing on stricture formation. Once the infection is established and whether the urethritis becomes posterior or remains anterior to the *compressor urethræ* muscle, either retrogression influenced by the leucocytosis and the treatment occurs, or extension to complications supervenes. That is to say, if the gland ducts remain patent and drain spontaneously, the hyperæmia and œdema gradually disappear and complete resolution takes place; but if, on the other hand, the opposite occurs, as it often does, the gland ducts become infiltrated and their mouths sealed over, miliary or even larger abscesses are formed which rupture either into the cavity of the urethra or exceptionally externally producing fistulæ. In any case, whether they become abscessed or not, these foci of chronic inflammation are the starting point of stricture owing to the laying down of granulation tissue and later on of young fibrous tissue in the process of repair. This is the common process in prolonged attacks of gonorrhœa and the infiltrations may be discrete or diffuse and vary greatly in number and position. Both the submucous changes described and the surface inflammation mentioned can be detected by the aero-urethroscope and treatment instituted at their inception.

Soft stricture or soft submucous infiltration responds well to treatment and leaves little trace of its existence, but hard infiltration or incipient organic stricture leaves a permanent scar in the wall of the urethra in spite of dilatations; and thereby hangs a tale.

Now, having mentioned strictures of the meatus and of the *fossa navicularis* or second meatus, let me proceed to dismiss them by a short reference to their diagnosis and treatment.

Thus the question at once arises: how much contraction constitutes stricture of the meatus? Strictly speaking, a meatus is constricted if a probe, introduced into the fossa and rotated so as to sweep the point outward along the floor of the urethra, encounters a thin membrane which it must surmount in coming out of the meatus. Practically, however, stricture of the meatus rarely produces any symptoms unless it is actually so small as to obstruct micturition, as it may after an inflammatory attack. But such cases are exceptional and most men go through life in blissful ignorance of the size of their meatus unless they acquire a urethritis, in which event the stricture should be cut lest the little pocket behind it perpetuate the infection.

The only way to cure a stricture of the meatus is to cut it with a bistoury under local anæsthesia obtained by a crystal of cocaine in the meatus or the injection of "Novocain" into the frenum. After that it must be kept dilated for a time.

Diagnosis.

And now a word on the diagnosis of true stricture will put us in an attitude of mind to consider some of the principles of the treatment of it. Starting from a point in the examination of the patient in which the presence of an obstruction in the urethra has been determined by a sound, the differential diagnosis lies between organic stricture, spasm and chronic inflammation. If the largest sound that will enter the meatus has been passed down to the bulbous urethra and is here held up against an obstruction, it overcomes the contraction of spasm, but will either fail to pass a stricture, or, if it does pass and is allowed to rest in place for a moment and if an attempt at withdrawal is then made, the manœuvre will be opposed by the firm grasping of the stricture. If no grasping occurs, there is no organic stricture.

Let me put this another way. Inasmuch as stricture is only an accentuation of the pathological process that constitutes chronic anterior urethritis and is in fact a band of scar tissue in the urethral mucosa and submucosa extending around the urethra, and inasmuch as the tendency to contract is an inherent quality of scar tissues and therefore of stricture, the diagnosis of stricture depends upon the result obtained by the passage of the diagnostic sound. Any infiltration detected by the sound, larger than, say, 24 F., and which exhibits no tendency to grip may be termed chronic urethritis, while the term stricture should be reserved for such infiltrations as grip a sound smaller than this.

The accompanying table will summarize the diagnostic features that have been mentioned.

Condition.	Observation.		
	Shreds and Pus in Urine.	Obstruction.	Grasping.
Organic stricture .	Present	Present	Present
Spasm of the *compressor urethræ* muscle	Not present unless there is inflammation	Only in the membranous urethra	None
Chronic urethritis .	Present	Sometimes	None

Treatment.

Without doubt the surest preventive is the intelligent and painstaking treatment of anterior urethritis in its chronic stage. For traumatic stricture the proper prophylaxis is suprapubic drainage to divert the urine as soon after the injury as the condition of the patient will permit, to be followed then or later by perineal section and possibly suture, the wound being left open.

The treatment of organic stricture is succinctly as follows. Enlarge the urethra by dilatation, aided, if necessary, by cutting. Then maintain its calibre by dilatation. I never cut a stricture if I can dilate it, and have come to realize that the patient is not cured unless he stays cured. I believe that cutting is at best a substitute for dilatation, while divulsion is little short of ignorant brutality.

Since the sound is the instrument best suited to the relief of stricture and since unfortunately it is easier to use a sound wrongly than rightly, some remarks on the use and effects of the sound will not be amiss.

Now a stricture is a scar with a congested surface. Should it be cut or should it be influenced by physical means? If it is cut, the symptoms are relieved; the obstruction is apparently removed, but the scar is still there. In fact, there is rather more scar than before; and if the former scar contracted, the new one will do the same. Certainly this may be prevented by the passage of sounds to keep the lips of the wound apart, so that it may heal with so broad an insertion band that contraction will be of no moment. If the stricture is in the pendulous urethra, such a course may expedite the amelioration of the patient's suffering; but if the stricture is in the perineal urethra and of such a density as to give the shadow of an excuse for cutting, it will certainly relapse after the operation unless subjected to systematic and continued massage and dilatation by sounds.

The cutting merely relieves the congestion and gives a temporary relief to the contraction, while the sound certainly causes resorption of the exudate, or at all events of such exudate as has not become too organized. The effect is quite comparable to the effect of massage applied to any other part of the body.

The object of the passage of sounds is thus to lessen the congestion at the point of contact, to straighten out irregularities in the canal; and you will remember that, though pathologically single, many strictures are clinically multiple, the tightest being nearest the bulb. In addition the sound dilates the stricture, tireing it out as rubber is tired, and stimulates the deeper tissues to a favourable reaction which will result in softening of the cicatrix.

But to do this the sound must be passed gently and without bruising. If a given sound will not pass, try a smaller one, using a complete set and not one in which some sizes are missing. Usually if a suitable sound is passed properly, it may be followed with less pain that at first by another of the next larger size. It is a matter of everyday experience that the brutal passage of a sound, bruising and tearing the congested mucosa, is followed by a sharp inflammatory reaction which increases rather than diminishes the exudate. Such treatment is inexcusable and quite unnecessary. The stricture is already congested, the mucosa already inflamed, so why add insult to injury? Such is not the object of the sound. Nevertheless, however gently a sound is passed, there will always be more or less of a congestive reaction; hence in the treatment of stricture by gradual dilatation, and this is the method of choice, it is bad surgery to reintroduce instruments into the urethra before the lapse of seventy-two hours or better of five to seven days.

Let me repeat what old Omar Khayyám said to the potter whom he watched thumping his wet clay: "Gently, brother, gently pray." Remember that more than slight bleeding means either false passage or tearing, and tearing defeats your object. Do not use local or other anæsthesia, as pain is your warning signal, and lubricate your warmed sound with oil.

If the stricture, when dilated to the size of the meatus (the physiological gauge), recontracts with undue rapidity, further dilatation may be performed with Kollmann's dilators; the straight Kollmann dilator up to size 30 or 35 is used for stricture of the pendulous urethra, and the curved Kollmann up to size 40 or 45 is used for the bulbous urethra, dilation of a millimetre or two being obtained at each sitting. Once the stricture has been fully dilated, it must be held at that calibre by the occasional passage of sounds, at first once a week and as time goes on less frequently.

Such are the principles of treatment of uncomplicated stricture of large or medium calibre and we now come to stricture of small calibre. They are considered separately because they are best treated with soft rather than steel instruments and not because they require different treatment. The use of soft bougies is advisable on account of the danger of making a false passage in an obstructed urethra with a small metallic instrument. No one can appreciate how easily a false passage can be made until he himself has actually made one, and anyone may go on in blissful ignorance dilating the false passage instead of the stricture. If, however, a false passage is made, it should be left absolutely alone for at least two weeks if the patient can urinate. Blood will issue for a day or two, then pus for a few days and then, in favourable cases, the wound will commence to heal. In these cases of tight stricture lies the value of full knowledge of all the irregularities of the urethra to be obtained by the urethrogram and I would commend it to you. In attempts at the passage of a difficult stricture three or four filiform bougies should be passed to the point of obstruction and manipulated in turn. Pockets will become filled by several of them and finally one will enter the proper passage. Once a filiform or small bougie has passed in difficult cases, it should be fastened in with adhesive plaster. The urine will find its way out beside the bougie, whose presence will dilate the stricture. By the way, a very convenient instrument consists of a filiform bougie to which is attached a metal catheter. Occasionally, if the stricture is a simple band, the face of which may be reached by the urethroscope, this instrument may be of service. Adrenaline is usefully applied on a cotton applicator to check the bleeding which usually occurs, and the filiform bougie is passed under direct vision. This manœuvre, however, rarely succeeds when other means fail.

Following the successful passage of filiform bougies, dilatation is carried on with soft bougies and recourse is made to steel instruments only as soon as the stricture will admit Number 15 F. sound. If a tunnelled stricture of resilient or gristly nature is found which resists all attempts at dilatation up to more than, say, 8 or 9 F., it will be necessary to consider taking the patient into hospital for internal urethrotomy. In actual practice only a few patients will require this. There is no mortality from dilatation, but the mortality from internal urethrotomy may be as high as 4% or 5%, and the patient will still require dilatation after the cutting.

Urethrotomy, whether internal or external, may, however, be required if the stricture simply will not dilate, if the patient is pressed for time, or if urethral fever follows all attempts at dilatation (that is, stricture complicated by prostatitis). After internal urethrotomy a 30 F. sound should be able to pass and a catheter should be tied in for two to three days and the patient confined to bed, as hæmorrhage and infection do occasionally occur.

At external urethrotomy the bladder should be drained either suprapubically or perineally for a week or two.

The operation is simple enough if a guide (Syme's staff) can be passed through the stricture. In so-called impassable strictures (they are impassable only from the crookedness, not from tightness) the preliminary urethral injection of methylene blue will help materially, but even then, and especially when the perineum is infiltrated, identification of the posterior portion of the urethra may be very difficult and it may be necessary to open the bladder above the pubes and to do a retrograde catheterization in order to locate the canal. When found, the posterior segment should be dilated by a Teale's gorget and uterine sounds should be passed right into the bladder. This dilates the bladder neck, which is often contracted from the cicatrization following a long continued infection, and this, by the way, is ever present behind all strictures. After operation sounds should be passed for one or two weeks and as frequently thereafter as is necessary to keep the urethra at a calibre equal to 30 F. at least. Traumatic strictures are so notoriously resilient and rebellious and are so often made worse by sounds and unrelieved by section that they, in conjunction with some old hard strictures of the bulb, demand resection and end to end anastomosis after preparatory subrapubic drainage.

There only remain to be considered briefly stricture with complications, namely, stricture with retention of urine, stricture with periurethral or perineal abscess, stricture with infiltration or extravasation of urine, stricture with acute pyelonephritis and finally stricture complicated by fistulæ.

Acute retention of urine requires immediate relief. The hot bath method may be tried, and will be successful if the patient is suffering from retention for the first time, if he previously passed a fair sized stream and if the bladder is already not too full. It will also be the more likely to succeed if the water is gradually made sufficiently hot to induce nausea or faintness, both of which induce lessening of the congestion about the stricture and of the external sphincter. If this fails, the bladder may be aspirated every eight hours for twenty-four to thirty-six hours or drained by suprapubic puncture and gradual decompression in order to produce decongestion of the kidneys. Routine treatment is then instituted.

Periurethral or perineal abscess requires prompt evacuation and drainage by median perineal incision. The urethra should be opened and the stricture should be cut if it is of small calibre.

Extravasation of urine with stricture or following rough instrumentation demands immediate and radical incision with no thought of ultimate disfiguration; it must be accompanied by the suprapubic or perineal drainage of the bladder. It is a desperate condition and requires desperate means.

If acute pyelonephritis is present the bladder must be drained either by retention catheter or suprapubically until the temperature touches

normal, unless secondary retention has occurred in the ureter or renal pelvis, when pyelotomy or nephrotomy will be required.

The chief aim in the treatment of fistulæ is to remove the impediment to urination—to dilate the stricture. This done, the fistula may close. If this fails, suprapubic drainage and perineal urethrotomy or excision may be necessary.

May I conclude by saying that the principles underlying the treatment of stricture require the attributes of common sense, perseverance and gentleness.

MALARIA AND ITS TREATMENT BY THE GENERAL PRACTITIONER.[1]

By A. E. FINCKH,
Sydney.

TWENTY-SIX years ago, at the Australian Medical Congress of 1911, I read a paper on the treatment of malaria. I had, a few years previously, attended the diploma course at the Tropical Institute, at Hamburg, of which Professor Nocht was the director. In those days quinine was the only drug prescribed against malaria. Its action and its administration had been scientifically investigated, and had been put to the test at Hamburg; the method then recommended and which was the main object of the paper then read by me has stood the test of time. Thus in the 1936 edition of Professor Nocht's "Malaria", written especially for the general practitioner, the description of the use of quinine is identically the same as introduced by him in 1904. But, and this shows the trend of modern investigation, the paragraph dealing with quinine begins with: "If quinine is to be prescribed at all", which means that quinine is no longer recommended; "Atebrin" has displaced it.

Treatment of Malaria.

Preliminary.

Treatment, as well as prophylaxis, cannot be effective unless it is carried out on very definite lines which follow an exact system. Once begun, it must continue as laid down, without pause or interruption.

The drugs must not be taken on an empty stomach. They must be given after a meal, and even then followed by copious fluids. Treatment must be begun as soon as a diagnosis has been made or is suspected. It is wrong to await the occurrence of several attacks of fever before the drug is administered.

When suspicious of an acute fever being malaria, begin treatment for malaria at once; if within four days the temperature has not subsided and does not remain normal for several days, the case is not one of malaria. So soon as a regulation course of treatment is completed, this must be immediately followed by prophylactic treatment.

A person free from malaria proceeding to a malarial district need not begin prophylactic treatment before actual arrival. When a patient leaves a malarial district prophylactic treatment must be continued for eight weeks after all danger of a new infection has passed.

Every patient with malaria, even if incorrectly or insufficiently treated, together with all possible after effects, will undergo spontaneous cure within five years. There is no such thing as "my old malaria" as a recurrence of the disease once a patient has lived more than five years in a malaria-free country. This is important in connexion with returned soldiers, missionaries and nurses, as well as all persons applying for compensation.

The Treatment.

Malaria is one of the few diseases against which we possess specific drugs. They are quinine, "Atebrin" and "Plasmoquine". However, none of these drugs by itself represents a *therapia magna sterilisans*, even when given in large doses or by long continuation of the treatment. The reason lies in the fact that the malaria parasite has a life history consisting of a sexual and an asexual generation. And whereas quinine and "Atebrin" are capable of destroying the asexual forms, the sexual forms (the gametes) are not affected to any great extent; "Plasmoquine", on the other hand, has an elective influence on the sexual generation. Hence quinine and "Atebrin" are used in combination with "Plasmoquine".

In the selection of the drugs the following facts have to be considered. In the tertian and quartan types quinine and "Atebrin" are equally effective; in the tropical form "Atebrin" is by far superior in its action. But neither quinine nor "Atebrin" acts upon the gametes, hence "Plasmoquine" treatment with its action on the gametes must follow.

Quinine.—If quinine is being prescribed at all, which means that it should not be used if "Atebrin" is available, it is given on the lines of the original "Nocht Quinincure" of 1904.

The reasons why quinine has been displaced by "Atebrin" are: (i) The possible idiosyncrasy, the after-effects and possible complications, are all reduced to a minimum with "Atebrin". (ii) The treatment is more prolonged than with "Atebrin". (iii) The treatment is less certain than with "Atebrin".

We may take it then that quinine is not to be dispensed unless "Atebrin" is not procurable. When it is prescribed the following is the detail. The hydrochloride is best, and the most effective method is to prescribe it in liquid form. When it is given as tablets, pills *et cetera*, it is important to test their solubility from time to time. Placed in lukewarm water, they should break up within two or three minutes. If they do not break up, they must be discarded, since they may pass undissolved through the alimentary tract.

Quinine should not be given on an empty stomach; it may be given during a meal, or after any food,

[1] This paper is in large measure an extract from Professor Nocht and Professor Mayer's "Malaria", 1936 edition.

liquid or otherwise. Children should be given quinine in liquid form, in syrup, marmalade, porridge or tea. If tablets are dissolved to prepare a daily supply, the solution must be well shaken before being poured out.

The adult dose is 1·0 gramme (15 grains) a day. Adults above normal weight are given 1·3 grammes (22 grains). Children up to one year are given 0·09 gramme (one and a half grains) a day, weight and general condition being taken into consideration. Children over eight years can be given the adult dose of 1·0 gramme (15 grains).

The daily amount is given in five doses, at intervals of two to three hours. An adult is thus given 0·18 gramme (three grains) five times a day. This dose is given while the fever continues; it is then administered for another five days. Then continue as follows: Stop the quinine for two days, then give it for three days. Stop it for three days, then give it for three days. Stop it for four days, then give it for two days. Stop it for five days, then give it for two days. Continue the treatment for four weeks with five quinine-free days and two quinine days.

There is still much controversy as to how long quinine treatment should be continued, since relapses are unavoidable and will occur even with large doses of quinine and long continued treatment in 25% to 30% of cases. Even intravenous and intramuscular administrations do not show better results, and should be reserved for very serious cases. It is therefore easy to understand that "Plasmoquine", discovered in 1926, and "Atebrin", discovered in 1930, have displaced quinine.

"Plasmoquine".—"Plasmoquine", on account of its unique action on the sexual generation of the malaria parasite which is not affected by quinine or "Atebrin", must be looked upon as the conqueror of malaria.

However, experience has now so accumulated that, for reasons which are outside the scope of this article, it is considered inadvisable to administer "Plasmoquine" by itself. If "Atebrin" is available, a course of "Plasmoquine" is prescribed after the course of "Atebrin" has been completed. Or, and again only if "Atebrin" is not available, a course of "Plasmoquine" is given in combination with quinine in the form of "Quinoplasmoquine".

"Quinoplasmoquine".—Quinoplasmoquine is sold in tablets containing 0·01 gramme (0·15 grain) of "Plasmoquine" and 0·3 gramme (4·5 grains) of quinine.

Prescribe as follows: To an adult give for twenty-one days four tablets a day; one tablet at a time after a meal, or after taking food or liquid (never on an empty stomach).

Children up to five years receive half a tablet twice a day; children of six to ten years half a tablet four times a day; children of ten to fifteen years one tablet three times a day; children over fifteen years the adult dose.

"Quinoplasmoquine" must not be given if there is the slightest idiosyncrasy to quinine or any suspicion of blackwater fever.

"Atebrin".—The specific drug known as "Atebrin" was invented in 1930. Its chemical formula need not be mentioned in a practical article like this.

"Atebrin" acts only on the asexual generation of the parasite; the gametes are not affected. It is sold in tablets of 0·1 gramme (one and a half grains). They have a bitter taste, must always be taken after a meal or food, and must be washed down with a copious drink.

Adults are given one tablet three times a day. Persons much above the average weight are given one tablet four times a day. Children take "Atebrin" very well, even babies. It is best given in milk. Children up to one year take half a tablet a day; children of one to four years take one tablet a day; children of four to eight years take two tablets a day; children over eight years of age take the adult dose.

Weight and general condition should be taken into account. The above doses are given for seven days. There is no need to carry on for more than seven days, nor is this series to be repeated.

"Atebrin" treatment must be followed by treatment with "Plasmoquine". Experience has taught that the two drugs must not be combined, as is the case with quinine.

"Plasmoquine" is obtainable in tablets, each containing 0·02 gramme (0·3 grain) of "Plasmoquine" simplex. Thus following on the seven days with "Atebrin", give for five days half a tablet three times a day.

Babies should be given a quarter of a tablet per day; children of one to five years, half a tablet per day; children of six to ten years, one tablet per day. The weight and general condition must be taken into account.

"It can thus be taken that the treatment with 'Atebrin', together with the immediately following treatment with 'Plasmoquine', offers the best prospect to cure malaria and to prevent recurrences."

Whenever treatment for any one attack of malaria is completed, as above, prophylactic treatment must be immediately instituted. Similarly, if during prophylactic treatment an attack occurs, it must immediately be prescribed for as if it were a first attack.

Prophylaxis.

Whenever a visit is paid to, or a sojourn made in, a district where malaria is endemic, precaution must be taken to avoid infection. Prophylactic treatment need not begin before arrival in a malaria district; after a subject has left such a district the treatment must be continued for eight weeks. The treatment must be continuous, without any interruption whatsoever.

For many years quinine was the only drug employed for this purpose. Today it is recognized that quinine does not offer absolute protection; again "Atebrin" has replaced it. If "Atebrin" is

not available, quinine as a prophylactic is given as follows. An adult is given daily 0·36 gramme (six grains) in two doses of 0·18 gramme (three grains). Children of four to twelve years are given 0·18 gramme (three grains) daily in two doses. Smaller children are given 0·045 gramme (0·75 grain) daily for each year of life.

"Atebrin" Prophylaxis.—"Atebrin" is *facile princeps,* not only in its effects, but also in the method of administration. It is sufficient to prescribe for adults 0·36 gramme (six grains) (four tablets) per week. This is given in two doses of 0·18 gramme (three grains) (two tablets) on two days with an interval between, say every Wednesday and Saturday.

Children are given the following dose twice a week. Children up to two years of age are given half a tablet; children of two to five years are given three-quarters of a tablet; children of six to eight years, one tablet; children over eight years of age, two tablets. "Plasmoquine" is not to be given for prophylaxis.

The Diagnosis of Malaria.

The diagnosis of malaria depends in the first place on the finding of the parasite in the blood. However, this is not absolutely certain, since the parasite may be absent from the peripheral circulation, especially if any quinine has been taken. A blood count is always useful; monocytosis, basophilia and polychromasia and absence of a leucocytosis assist in the diagnosis. It has to be kept in mind that some other febrile disease may occur during a chronic attack of malaria.

When the possibility of infection exists, every febrile condition should lead to suspicion of malaria. Indeed it is of great diagnostic importance that antimalarial treatment should be begun at once. If within three to five days the temperature does not fall to normal and stay normal for several days, the condition is not malaria.

Blackwater Fever.

Blackwater fever is always a hæmoglobinuria, not a hæmaturia; that is, the sediment does not show red blood corpuscles. This fever must always be looked on as due to an attack of malaria.

With regard to the differential diagnosis, methæmoglobinuria due to too large doses of "Plasmoquine", and especially Weil's disease with hæmaturia, may easily be mistaken for blackwater fever.

Treatment.

First of all, quinine and "Plasmoquine" must be stopped immediately. Absolute rest in bed is essential. The distressing vomiting must be stopped; it may require a chloroform mixture. The liver function should be assisted by glucose given orally or rectally. Diuretics should be ordered, and copious fluids; anything should be given to prevent anuria, which is always deadly. Sodium bicarbonate and potassium citrate are given till the urine becomes alkaline.

While blackwater fever exists, all treatment for the malaria must be discontinued; when the patient has somewhat recovered, it is time to begin malarial treatment again; but quinine and "Plasmoquine" must not be given. Give "Atebrin" only, followed as usual by "Plasmoquine".

Intramuscular injections should be employed only in very serious cases, as when coma or severe gastro-intestinal disturbance occurs, and with children. No patient should be allowed to die of malaria without receiving intramuscular injections. Two injections at twenty-four hour intervals are recommended. The solution must be freshly prepared. Dissolve one tablet of "Atebrin" in three cubic centimetres of distilled water, or three tablets in nine cubic centimetres.

Male adults receive nine cubic centimetres of this solution; women and men in poor condition receive eight cubic centimetres; weakly women, seven cubic centimetres.

Children (age and general condition must be considered) of six months to two years receive 1·0 cubic centimetre; children of two to four years receive 2·0 cubic centimetres; children of four to six years, 3·0 cubic centimetres; children of six to ten years, 4·0 cubic centimetres; children of ten to twelve years, 5·0 cubic centimetres; children of twelve to fifteen years, 6·0 cubic centimetres; children of fifteen to eighteen years, 7·0 cubic centimetres. These injections must be followed by "Atebrin" given orally for five days.

Summary of Treatment of Malaria.

The following is a summary of treatment for an adult. "Atebrin", one tablet, is given three times a day after meals for seven days. In serious cases intramuscular injections are given for the first two days, then for five days per month. This is followed by "Plasmoquine", half a tablet, three times a day for five days.

Prophylaxis.—On two separate days (for example, on Wednesday and Saturday) two tablets are given per day, and this is continued while the patient is residing in a malarial district, and for eight weeks after he leaves it.

Reports of Cases.

AN UNUSUAL COMPLICATION OF COLLES'S FRACTURE.

By H. A. SWEETAPPLE, M.B., Ch.M. (Sydney), M.Ch.Orth. (Liverpool), F.R.C.S. (Edinburgh),
Assistant Orthopædic Surgeon, Saint Vincent's Hospital; Assistant Orthopædic Surgeon, Eastern Suburbs Hospital; Clinical Assistant to the Orthopædic Department, Royal Prince Alfred Hospital.

I CAN remember three fractures of the radius which, in spite of satisfactory reduction, confirmed by X ray examination, later gave an unsatisfactory cosmetic result. These fractures presented the features of typical Colles's fracture, and the notes of the latest of them are as follows.

The illustrations are tracings of the appropriate X ray films. In the lateral views the ulna has been omitted.

Mrs. P., aged forty-two years, tripped and fell onto the pronated dorsiflexed right hand. Examination revealed the usual dinner fork deformity, with shortening of the radius (see Figure I). Reduction was effected and aluminium gutter splints were applied, the anterior one to the proximal wrist crease and the posterior one to the metacarpal necks. The post-reduction radiograph is shown

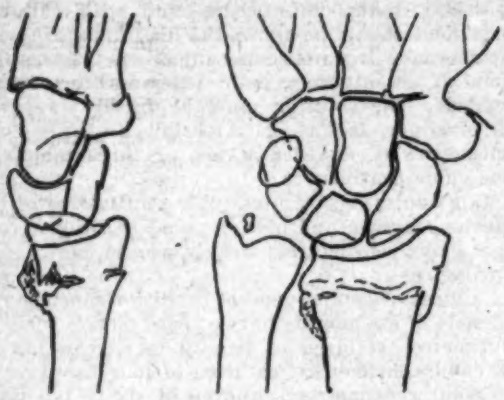

FIGURE I.
Film taken shortly after fracture and before reduction.

in Figure II. It will be seen that the position is now quite good; there is still a little backward tilting of the lower radial fragment, but full length has been practically restored (compare the relative level of the ulnar and radial styloid processes in this illustration with that in Figure I).

Two weeks later clinical examination revealed a recurrence of radial deviation of the hand, with the ulnar and radial styloid processes at the same level. The radiograph

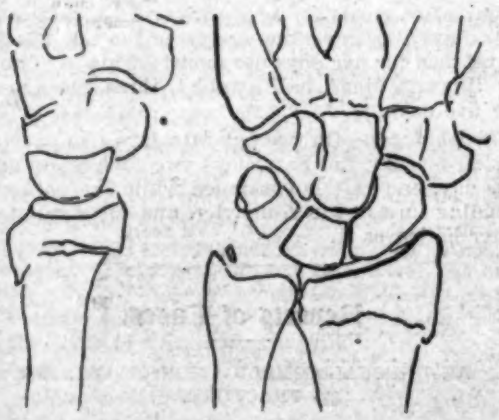

FIGURE II.
Film taken after the first reduction.

(Figure III) confirms this and also shows even more backward tilting than the first film (Figure I). This occurred in spite of uninterrupted immobilization.

On the next day, under general anæsthesia (the fracture was sixteen days old), by means of manipulation and prolonged traction, the deformity was reduced, the styloid processes resumed their normal relationships and splints were again applied. A radiograph on the following day (Figure IV) showed that the displacement had recurred and the position was as bad as ever.

Several facts present themselves for discussion. First, it is very unusual for an ordinary Colles's fracture to become redisplaced after reduction, and the simplest form of immobilization is usually adequate. Secondly, in the case reported, reduction remained satisfactory after the first manipulation for about a week. Thirdly, a second reduction was satisfactory at the time, but had relapsed completely the next day. Fourthly, the radiographs reveal that the fracture was not an ordinary Colles's fracture, but was severely comminuted.

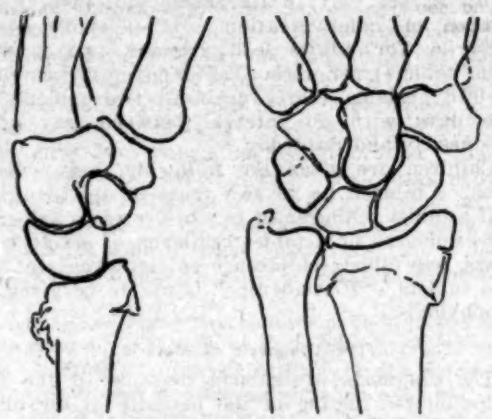

FIGURE III.
Film taken two weeks after the satisfactory first reduction. Immobilization has been effective during this period.

It remains to consider why displacement recurred spontaneously and why it did not recur for a week. I believe that at the first reduction the comminuted fragments were moulded into place by manipulation and stayed in place until softening occurred during the process of decalcification

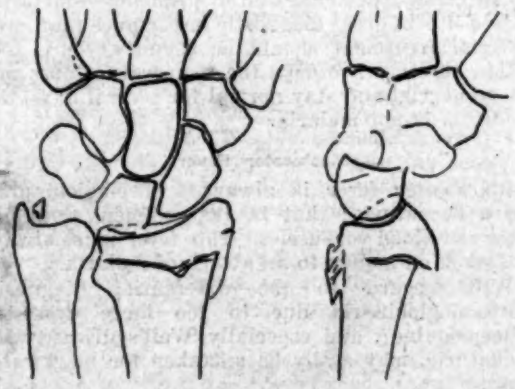

FIGURE IV.
Film taken on the day after the second reduction. The splints applied had been unable to maintain the position obtained.

tion which precedes callus formation. When this softening took place, during the second week, the site of the fracture collapsed and deformity recurred. Subsequent manipulation was ineffectual, because, though moulded into place, the fragments had no solidity. I think that the same hypothesis explains the deformity of Kümmel's disease following an unrecognised fracture of a vertebral body.

The subsequent history is as follows. The deformity has persisted, but has become no more marked. There is radial deviation of the hand, with prominence of the head

of the ulna, but there is no restriction of movement at the wrist or radio-ulnar joint, the grip is strong and the patient is quite satisfied with the usefulness of the hand. In short, the functional result is satisfactory, though the appearance is not.

The other cases which I mentioned were similar in the two essential features—the fracture was a comminuted one, and reduction remained complete for one or two weeks. Function in both cases was satisfactory. All the patients were women.

I do not know of any method of preventing this complication, except by continuous traction for four or five weeks. A suggested procedure is the use of skeletal traction, with a Kirschner wire through the olecranon and another through the four medial metacarpal bases, both to be incorporated in a plaster case enclosing the limb before traction is relaxed. I have not tried this procedure, and unless a cosmetic result is specifically demanded by the patient, I do not think that my bias against skeletal traction will allow me to do so in the future.

AN UNUSUAL CASE OF JEJUNAL OBSTRUCTION.

By J. C. BELL ALLEN, M.B., Ch.M., F.R.C.S. (Eng.),
Honorary Surgeon, Royal South Sydney Hospital; Honorary Assistant Surgeon, Eastern Suburbs Hospital.

Mrs. A.J., aged forty-eight years, was seen on February 23, 1936, at about 9 p.m. She then gave the following history.

About two hours after the evening meal, which had consisted largely of salads, in particular cucumber, the patient had an acute attack of severe upper abdominal pain; this was accompanied by vomiting and diarrhœa. The patient attributed the pain to the fact of eating cucumber, as previously she had similar symptoms following the ingestion of this vegetable.

Examination revealed a well developed woman, of somewhat florid complexion. Her abdomen was tender over the whole area with no particular localization of her pain. There was a mid-line sub-umbilical scar, the result of an operation for hysterectomy twelve years ago; at the lower end of this scar there was a small ventral hernia. As nothing definite could be detected, she was given a sedative. When she was seen the following morning, her condition had not improved; she was still vomiting and complaining of abdominal pain. Examination of the abdomen revealed little change from the condition seen on the previous evening; there was some slight increase of tenderness in the upper part of the abdomen. The patient was then transferred to hospital and was given two enemata; the first yielded a constipated fæcal result and the second brown fluid; flatus was present after both enemata. The patient was kept on palliative treatment. The following day, February 25, there was increased tenderness, with some rigidity in the upper part of each rectus muscle; the abdomen was also becoming distended; the patient was still vomiting, but her diarrhœa had ceased. In view of these findings, it was decided to open the abdomen on the possibility of some obstruction being present.

At operation, which was well stood, the following conditions were found. Some free fluid was present in the peritoneal cavity; in the jejunum, about two feet from the duodeno-jejunal flexure, there was a hard mass about three inches in diameter with the bowel acutely inflamed over this area; on the posterior aspect there was a small perforation, around which some fluid had collected. This mass had the appearance of a perforated newgrowth, and a rapid resection of the involved area of bowel was carried out, about eighteen inches of small gut being removed. A side-to-side anastomosis was performed and a tube was put into the upper section of bowel and brought out through the abdominal wall for drainage of this segment; the abdomen was closed and the patient returned to bed, draining a fair quantity from the tube; her condition was moderately good. Vomiting continued after her operation and her condition rapidly went off; she died of toxæmia some thirty-six hours later.

On incising the bowel which had been removed, the tumour was found to be a mass in the lumen of the bowel not attached to its wall. This, on microscopic examination, was subsequently shown to be fæcal, around which were pieces of undigested vegetable, cucumber and onion, which had, no doubt, accounted for the sudden onset of her obstruction. The bowel wall above this area was considerably thickened compared with that below, indicating that the mass had been present for some time past. Sections of the bowel wall showed inflammatory changes *plus* hypertrophy of muscle in the upper segment.

Figure showing specimen removed at operation. The fæcal masses may be seen. The upper section of bowel has been opened and hypertrophy of the bowel wall is well shown in this area.

Comment.

This case represents an unusual type of small bowel obstruction. No doubt the intra-enteric mass had been present for some considerable time, and it is rather surprising that more symptoms were not present at an earlier stage. It would appear that the patient's opinion was correct with regard to the salad producing the

symptoms, that is to say, the obstructive symptoms, the blocking being due to pieces of undigested cucumber and onion. Possibly the perforation was also due to a sharp piece of this material, although it is more likely that it was a pressure phenomenon.

This case illustrates several important facts.

1. The occurrence of large fæcal masses in the upper part of the small bowel and the paucity of symptoms occasioned by them.

2. The risk of adopting expectant measures in possible obstruction high in the small intestine.

3. The futility of attempting drainage of the upper section by the tube, as although a fair amount of material drained through this tube during the thirty-six hours following her operation, *post mortem* examination showed marked distension of the stomach and the upper segment of the small intestine by a large quantity of fluid. It would appear that it is far preferable to use siphon drainage with an indwelling tube in the stomach.

Acknowledgements.

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Reviews.

RADIOLOGY OF THE DIGESTIVE TRACT.

THE second edition of A. E. Barclay's "Digestive Tract" contains much new information that has been gathered together since the first edition which was published in 1933.[1] It is the most complete treatise on this wide subject published in the English language and it can be regarded as a record of personal observation by a world's leader in this class of work. All the latest work in gastro-intestinal and gall-bladder disorders is considered, including the modern anatomy and physiology of the gastro-intestinal tract and the introduction of cinematography into the study of the various pathological conditions of these tracts. The section on pathology has been considerably enlarged and two new appendices deal with the injurious radiations to which the radiologist is exposed and with the legal ownership of X ray films. In the introduction, the author points out that the radiologist should be possessed of a very wide knowledge of anatomy and of clinical medicine; without these, elaboration of apparatus or perfection of X ray pictures is of little avail and unless the radiologist is a good clinician his opinion is of little more value than that of the lay technician. Of prime importance to the radiologist is a knowledge of the normal.

The arrangement of this volume can only be described as perfect. It is divided into three main parts. The first part deals with technique—routine screening, palpation, reporting of findings. Part II is concerned with the normal gastro-intestinal tract and includes a vast amount on the author's conception of the modern anatomy and physiology of the various organs. In Part III the author discusses the pathology of the digestive tract (including the gall-bladder). Various appendices dealt with the organization and equipment of radiographic departments, radiation risks, secondary radiation and various tests for secondary radiation, protection and the ownership of the X ray film.

In the section on technique the author insists on a regular routine, as mistakes can be avoided only if such rigid routine is followed. The meal should be followed from the first mouthful and the œsophagus and chest should always be included in the fluoroscopic examination. In hospital work the "double meal" method has often been employed in order to save time and to deal with large numbers of patients, but confusion by shadows of the first meal is often unavoidable and may call for a second examination. The author rightly considers that hospitals should only deal with in-patients, as it is impossible to find sufficient skilled radiologists to deal with the great numbers of patients referred from outside sources.

Anyone who reads the section on the technique of fluoroscopy will agree that the examination of the gastro-intestinal tract must always remain the province of the highly trained radiologist. All "amateurs" should read this section before attempting this class of work, and after reading it they will agree that it is far beyond the reach of the ordinary general practitioner who possesses an X ray machine.

In the teaching of radiology the author stresses the great possibilities of the use of cinematography; unfortunately it is too costly at present, but in the near future should be a readily available method. In screening the author describes the ideal method of palpation under a small field of illumination. If this advice is followed, the operator should find it possible to avoid unpleasant effects. Once again we find that the importance of visual accommodation before fluoroscopy is insisted upon and nobody should attempt screening unless the luminous dial of a wrist watch is uncomfortably bright. Included in this section are many precepts on "Do" and "Don't" which should be of great value to beginners. The author draws attention to the unreliability of text-book descriptions of the position of the various abdominal viscera; every individual shows some difference in the position of organs; even in the same individual there are variations in these positions caused by posture and emotional states, and every case must be considered after due allowances have been made for these possible variations. Physiology also fails to cover the various functions of these alimentary canal organs and too much reliance should not be placed on alleged proptosis and visceroptosis, as in the presence of these conditions (as shown radiographically) perfectly normal function is present in the majority of cases. In regard to mobility the author draws attention to the fact that Nature abhors fixation of abdominal viscera; normally all organs are mobile and it is only when fixation occurs from adhesions (post-inflammatory or post-operative) that symptoms are produced. The technique of colonic examinations by the use of the opaque enema is described in a most illuminating manner and even the most experienced radiologist can learn a good deal from studying it. Very little new matter is found in the section on gall-bladder pathology, but the descriptions for correct placing of the subject are well worth study.

Appendix I deals with the organization and equipment of an X ray department. The author deplores the charging of small fees in hospital departments (a practice beloved by hospital authorities), as he considers that such charges cover only a small part of the cost of such departments and do not take into consideration the skill of the radiologist given in an honorary capacity.

Appendix II deals with the risk to the radiologist from exposure to X rays. Efficient protection can easily be obtained and it is quite easy to save the radiologist and technician from damaging radiations. This book is most readable and no medical man should attempt fluoroscopic and radiographic examinations unless he is thoroughly conversant with the whole of its contents; even when the subject matter has been absorbed, the reader will realize that it will take years of practical work before he can consider that he is even approaching the standard set out by this great author.

[1] "The Digestive Tract: A Radiological Study of its Anatomy, Physiology and Pathology", by A. E. Barclay, M.A., M.D., D.M.R. and E., M.R.C.P., F.A.C.R.; Second Edition; 1936. London: Cambridge University Press; Melbourne: S. Jaboor. Crown 4to, pp. 462, with illustrations. Price in England: 36s. net.

The Medical Journal of Australia

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THE GROWTH OF MAN.

PROFESSOR JONATHAN C. MEAKINS, in his interesting oration in memory of the late Charles Clubbe, published in this issue, has discussed the growth of the human body. All who remember Charles Clubbe's love of children and his constant endeavour to promote their welfare, whether they were sick or well, will agree that the subject was wisely chosen. At the same time it must be admitted that Professor Meakins attempted an impossible task, for the inner mysteries of growth cannot be unveiled. We do not know how (to quote Alexis Carrel) the molecules of chemical substances associate in order to form the complex and temporary organs of the cell. We do not know how the genes contained in the nucleus of a fertilized ovum determine the characteristics of the individual deriving from that ovum; nor have we any idea how cells organize themselves by their own efforts into societies such as tissues and organs. Professor Meakins, as was but natural, devoted his attention almost entirely to the stature of man; and he has concluded that, given a normal pituitary and thyreoid function, with a proper supply of vitamin *B*, amino-acids, ample food supply and physical exercise during the years between five and twenty, the stature of a race may be increased to the optimum of Grecian perfection. To promote the growth of healthy human bodies is one of the first duties of medical practitioners; readers will, therefore, be grateful to Professor Meakins for his clear exposition.

It has been said that man is a compound of tissues, organs, fluids and consciousness. The growth of tissues, organs and fluids, and their perfect interaction so that they function as a united whole, are indeed a mystery; but the mystery is increased when, as indeed we must, we think of a young person as a conscious, sentient, volitional being—as a being with a developing mind as well as a growing body. Well-developed bodies of high stature, supple of limb and keen of eye, are of small account if the mind is feeble, if moral sense, judgement and audacity are lacking. Ideally man should grow in wisdom as well as in stature. An athletic body and a high degree of intelligence are not necessarily concomitants. Intelligence depends on a highly developed cerebral cortex, and the intellectual capacity of different persons varies enormously. Without a certain intellectual endowment mental development is impossible. The matter is well put by Wood Jones and Porteus in their book "The Matrix of the Mind" when they state:

> Almost one hundred years of intentional effort with defectives involving the use of all kinds of ingenious systems of teaching methods have proved conclusively that, intellectually speaking, whatever useful things you may make out of a sow's ear, a silk purse is not one of them.

They also write:

> Education, or environment, writes on each slate the lessons of social inheritance but some slates are much better as writing material than others.

The question as to whether anything can be done to endow children with what, for sake of a better term, we may call a super-cortex would lead to a discussion on eugenics; obviously this cannot be undertaken. At the same time we must remember that the growth of the tissues of the central nervous system after birth depends *inter alia* on the nourishment that a child receives in his early

years—on the dietary and other considerations that are set out by Professor Meakins as likely to produce individuals of Grecian stature. A child that is starved and therefore stunted in body will most likely be tardy in mental development. To watch the gradual unfolding and development of a child's mind is most fascinating; to be responsible for its instruction and for the creation of its environment is an enormous responsibility. Whether the potentialities are great or small, for the full development of intellectual powers exercise and favourable environmental conditions are necessary.

Doubtless there are some who would hold that it was neither necessary nor wise to attempt to raise the intellectual level of the community. Admittedly there are many persons whose cortical endowment is so small that any attempt to improve their minds would be foredoomed to failure. At the same time there is no gainsaying the argument that every person owes it to himself to take just as much care of his mind as he does of his body. From the public point of view also it is at least as important that men and women should be intelligent, thinking persons as that they should have the bodily proportions of Grecian statues. No one knows what thought is; no one knows how or where it originates; none, however, can doubt its power. It behoves every man and every woman to keep his or her whole being fit for the business of life. A great deal of attention is paid to physical training, sport and bodily enjoyment; more attention should be paid to the acquisition of intellectual power, which, as Carrel reminds us, is augmented by the habit of precise reasoning, by the study of logic, by the use of mathematical language, by mental discipline and by complete and deep observation of things. The direction of our thinking can and should be controlled. We should do well to remember the words of Paul of Tarsus when he wrote to the Philippians:

> Whatsoever things are true, whatsoever things are honest, whatsoever things are just, whatsoever things are pure, whatsoever things are lovely, whatsoever things are of good report; if there be any virtue, and if there be any praise, think on these things.

Current Comment.

THE MOUND BUILDERS.

Books upon the subject tell us that the prehistoric inhabitants of North America lived mainly in the valleys of the Mississippi and Ohio Rivers. Opinions as to their exact identity vary, but a generally held view is that they belonged to the stone age and that the Indians of today are their descendants, though their relationship with the American Indians of colonial times has not been completely established. The culture of this ancient people was of a high order and showed an aptitude for the making of objects in shell, stone and bone. Scattered over the country between the Alleghany and the Rocky Mountains, but chiefly in Ohio, Illinois, Indiana and Missouri, are the earthworks, often gigantic, which led to the bestowal upon this race of the name "Mound Builders". In addition, huge burial grounds of this people, certainly antedating the coming of De Soto and his men in 1539 into a region where the Indian population was scanty, have long been known to exist in Eastern Arkansas.

E. G. Wakefield, S. C. Dellinger and J. D. Camp[1] have recently examined skeletal remains from more than 400 graves in this area, their object being to determine whether lesions could be found in them which would be regarded as clinical entities today. To make the inquiry of scientific worth, all diseased skeletons were retained for study, which included repeated radiographic examinations. The remains, for the most part, lay in graves between eighteen and twenty-four inches in depth, and were sometimes enclosed in rough coffins of bark. Along with them were weapons and implements in stone, and pottery vessels, but no object of European origin.

The investigators held that certain bony irregularities were congenital. One femur, that of a young adult, showed at its proximal end the changes which mark a congenital dislocation of the hip joint; one humerus in a young adult was four centimetres shorter than its fellow of the opposite side, and suggested the end results of a birth injury or an attack of acute anterior poliomyelitis; other skeletons furnished examples of *spina bifida* of the lumbar and sacral vertebræ; and there were several skulls whose outlines had been altered by "cradling" or splinting during babyhood. Yet more interesting were two further skulls. In these the parietal bones were heavy and prominent, and from the peeling away of the outer tables had acquired a coralline appearance. In the skeletons corresponding to these skulls, the ends of the femora were increased in size, and the anterior surfaces of the tibiæ were smoothly rounded, while the bones themselves were slightly increased in diameter. The long bones of other skeletons showed like changes. These bony lesions are now known to be a clinical feature in certain hæmolytic and erythroblastic anæmias, and of sickle-cell anæmia; and the recognition of their

[1] *The American Journal of the Medical Sciences*, April, 1937.

characteristic radiographic appearances is a recent valuable addition to diagnostic methods. The congenital hæmolytic and erythroblastic types of anæmia have been stated by many observers to affect the children of dark-skinned races, and are now believed to be bound up with some inherited or racial defect. Considerations of space forbid a detailed account of the bony changes encountered in these dyscrasias—the increase in porosity in cancellous bone, the immense thickening of the diploë, the strange striations or "sun-bursts" running perpendicularly to the tables of the skull and clearly seen in skiagrams, the characteristic rarefactions and trabeculations found in pelves, vertebræ, ribs and scapulæ. But it may well be that this prehistoric American race suffered from blood dyscrasias, with resultant bony anomalies, believed to be peculiar to certain Mediterranean races. Osseous changes resembling those here mentioned are said to have been found amongst ancient Egyptians and the French people of the Gallo-Roman epoch.

Lesions suggestive of syphilis were discovered in certain of the skulls, clavicles and long bones of the mound builders. The evidence was sufficiently strong, the investigators believed, to support the view that the disease was endemic among the people of North America before the days of contact with Europeans. Nevertheless, Wakefield, Dellinger and Camp do not imply that their findings are presented as incontrovertible evidence of the new world origin of syphilis.

Further studies gave clear proof that trephining, whatever its motive, was probably practised by the members of this race. Teeth were also extracted and fractured bones treated with some skill. The teeth still present when the skulls were unearthed were usually healthy, but certain mandibles furnished evidence of advanced dental infection and suppuration. No gross bony changes denoting the presence of rickets were found, nor was any irregularity of the epiphyseal lines seen in X ray films. In general, the skeletons of these people were proof of good muscular development. The limbs were straight, the pelves narrow and the heads well shaped when not subjected to deforming procedures. No changes presumably tuberculous or due to infective arthritis were found, but there were examples of *spondylitis deformans* and of severe osteomyelitis. The chief points of interest in the article here commented upon are the probable relationship of the revealed bony changes to serious disorders of the blood and to the possible American origin of syphilis. The latter subject is a perennial topic for discussion amongst medical historians.

THE TRANSMISSION OF AMŒBIC DYSENTERY.

THE repercussions of an epidemic of amœbic dysentery which attacked many people in Chicago in 1933 are still being felt in medical circles. Recent epidemics of this disease have emphasized more than ever its widespread dissemination over the world and its potentialities not only in epidemic, but also in the more sporadic form. H. E. Meleney and W. W. Frye have just recorded the results of some experiments carried out by them on the pathogenicity of four strains of *Entamœba histolytica* received from the Department of Health of the City of Chicago shortly after the epidemic of 1933.[1] These strains were obtained from four persons; two of them had suffered from clinical symptoms, the other two were apparently perfectly healthy. Of the two who had symptoms of diarrhœa, one was a waiter at the hotel which was the chief source of the epidemic; in the other no contact with a known source could be traced. The healthy subjects from whose colons the amœbæ were isolated were both directly related to infected material. One was a maid in the hotel just mentioned, the other was an engineer in a manufacturing plant in which a survey for the entamœbæ was made because of water contamination. This last case is of particular interest because the supply of water was taken from Lake Michigan and supplied direct to the city after chlorination, but without filtration. It appears that the cysts of the *Entamœba histolytica* will withstand chlorine in the concentration used for killing bacteria in water, but that they may be removed by filtration through sand. It seems reasonable in the circumstances to suspect the water supply as a possible source of infection.

The authors' experiments were carried out on kittens, the usual laboratory animal for such investigations. They remark that the same wide difference in the behaviour of man to the amœba is found in laboratory animals, for the latter vary considerably in their capacity to resist or to become infected with undoubtedly pathogenic strains. For this reason extended investigations are necessary, but with these safeguards the method seems to be reliable. In this case all four strains were found to be not only highly pathogenic to kittens, but to a much higher degree than strains recovered from an endemic area of amœbic dysentery in another State. One year after the original experiments the strains were retested and practically identical results were obtained. Here again we have evidence that during an epidemic of amœbic dysentery in a large and closely populated zone highly pathogenic strains of the entamœba may become widely scattered through the community and not only cause clinical dysentery, but also be responsible for the establishment of carriers. As pointed out above, water is a possible source of such dissemination. Close study of the protozoa of the intestine is necessary, and when such problems arise, as they often do quite apart from the occurrence of special epidemics, it is necessary for an expert in protozoology to be available. Pathology and bacteriology are sadly starved subjects in Australia, and if little interest seems to have been taken in the pathogenic protozoa here, it is not because workers of ability are lacking, but because the necessity for encouraging them has not been recognized.

[1] *The American Journal of Digestive Disease and Nutrition*, March, 1937.

Abstracts from Current Medical Literature.

THERAPEUTICS.

Turmeric in Biliary Diseases.

A. OPPENHEIMER (*The Lancet*, March, 1937) describes investigations in the treatment of biliary diseases with turmeric (curcumin). This substance is an oriental plant which has been used in the East for centuries in the treatment of biliary disorders. Sodium curcumin was used; it was derived from a plant, *Curcuma domestica*. Intravenous injections of ten cubic centimetres of 5% sodium curcumin solution caused rapid emptying of the gall-bladder. By mouth a preparation called curcunat caused an enormous increase of the outflow of bile. This preparation was given in 67 cases of chronic and recurrent cholecystitis not requiring surgical treatment. Curcunat was given for three weeks in increasing doses. Generally the results were good. All patients except one were relieved; the one patient unrelieved was found later to have pus in the gall-bladder. In a number of cases a recurrence of symptoms occurred after some months and were relieved by similar treatment. In eighteen patients cholecystograms were made before and after treatment; in all of them the gall-bladder shadow was found either absent or very faint before treatment, but of normal density afterwards. Curcunat consists of dragées containing 0·25 gramme of sodium curcumin in 5·5 cubic centimetres of water for intravenous injection in urgent cases; and 0·1 gramme of sodium curcumin with 0·1 gramme of calcium cholate per dragée for oral administration.

"Substance 36."

GRACE BRISCOE (*The Lancet*, March 13, 1937) records investigations into the anticurare action of "Substance 36". This substance, methyl-phenyl-carbamic ester of 3-oxyphenyl-trimethyl ammonium methyl sulphate, is closely allied to prostigmin, but has been said to act differently. The symptoms of *myasthenia gravis* are similar to those of curare poisoning and have been relieved by prostigmin, which is allied to eserine. Aeschlimann and Reinert found that "Substance 36" had a similar though lesser action than prostigmin, and that the effect was more prolonged. The author showed that large doses of "Substance 36" caused depressant effects on cat's muscle, similar to those produced by prostigmin and eserine. Antagonism between curare and "Substance 36" was shown in nine tests. First, "Substance 36" was given before curarine and its effects were counteracted by a moderate dose of curarine; then curarine was given, producing myograms similar to those of *myasthenia gravis*; then 0·5 to 0·75 milligramme per kilogram of "Substance 36" was given intravenously and the myogram was restored in a few minutes. Thus the antagonism of curarine to "Substance 36" is shown to be as definite as its antagonism to eserine and prostigmin.

Sulphæmoglobinæmia.

G. DISCOMBE (*The Lancet*, March 13, 1937) describes sulphæmoglobinæmia following sulphanilamide treatment. Prontosil album and other brands of sulphanilamide or sulphonamide-P have been in use for some time. The injections of prontosil soluble may cause pain; and sulphonamide and prontosil have been found to cause sulphæmoglobinæmia. Seven patients who were admitted to Saint Bartholomew's Hospital had received over five grammes of prontosil soluble. Six of these patients showed some degree of sulphæmoglobinæmia and three showed marked cyanosis. Four of these patients had received frequent doses of magnesium sulphate. There seems to be some connexion between sulphæmoglobinæmia and sulphate administration, since only those patients who ingested sulphates or had them applied on dressings developed cyanosis. The seven patients referred to received from 2·7 to 25·0 grammes of sulphanilamide. The youngest patient, aged ten, received 2·7 grammes in three days. The average dose was 1·8 grammes daily. There were no obvious ill-effects, except the cyanosis, which was in some cases spectacular and alarming. The condition may be dangerous if the total hæmoglobin falls below 30%. The patient's blood should be examined every three or four days.

Optimum Treatment of Early Syphilis.

A. BENSON CANNON (*American Journal of Syphilis*, March, 1937) discusses the advantages and shortcomings of the various arsphenamine, bismuth and mercury preparations in the treatment of some six hundred private and hospital patients in view of their subsequent history. By every criterion old arsphenamine is better than both the new and the silver salt; bismuth and mercury preparations are of more equal value. In the healing of surface lesions and in reducing a positive Wassermann reaction, either in the primary or early secondary stage of a fresh infection, old arsphenamine shows itself the most efficacious of all preparations tried. The author found that patients thus treated also showed the lowest percentage of relapses and the highest percentage of satisfactory end-results. The earlier the treatment is commenced, the greater the chance of cure. If treatment is started while the patient is in the primary stage and does not give a positive Wassermann reaction, there are ninety-one chances out of a hundred that he will become and remain symptom-free. The appearance of a secondary eruption reduces the chances to eighty-five. Intensive treatment in the early weeks and months of the infection with a drug which has been proved to be therapeutically active, will give results in patients who could not be held for longer than six or eight months of regular treatment; whereas with a less active drug and courses more widely spaced, not even twice the dosage recommended can be expected to produce a reasonable percentage of cures. The optimum for the average patient with early syphilis remains one year of regular and continuous treatment as follows: a total of three courses, of ten injections each, of an arsphenamine and three courses of fifteen injections each of a mercury or bismuth preparation throughout the first year. During the first month the courses run concurrently, thereafter they alternate. The first six injections of the arsphenamine are given twice a week, and the following four at weekly intervals. The first course of injections of the mercury or bismuth preparation is given at five-day intervals for the first six doses, subsequent doses at weekly intervals. Between the arsenic courses potassium iodide by mouth is also given.

Imperfect Descent of the Testis.

THE treatment of imperfect descent of the testis with gonadotropic hormones has been used for several years, but it is still in the experimental stage. The experience of T. W. Mimpriss (*The Lancet*, February 27, 1937) in treating twenty cases at Saint Thomas's Hospital suggests that there are unsatisfactory results as well as harmful reactions. Six of the patients had had an unsuccessful orchidopexy. The preparation used was "Pregnyl" and it was administered intramuscularly in doses of 500 rat units, usually twice a week. The number of injections varied from eight to forty. There were only six successful cases. On the other hand, hypertrophy of the external genitalia was seen in nineteen instances; the nature of the hypertrophy is uncertain, but there is no doubt that some retrogression can occur and there is the possibility of ultimate damage to the testis. There is also the risk of producing premature sexual maturity, which may prove undesirable. It is considered, therefore, that nine is the earliest age at which the treatment should be given. Distinction is also made between retraction and maldescent, the former condition responding more readily to the therapy. The main indication for the treatment is bilateral maldescent of the testis when associated with subnormal genital development.

NEUROLOGY AND PSYCHIATRY.

Blood Volume in the Psychoses.

I. FINKELMAN AND D. HAFFRON (*The American Journal of Psychiatry*, January, 1937) have estimated, by

means of the dye method, the circulating blood volume in thirty-nine patients with schizophrenia, fifteen with manic-depressive psychosis, six with epilepsy, seven with involutional psychosis, seven with mental deficiency, two with paranoid state, one with senile dementia, and one patient with psychopathic personality. The ages of the patients with *dementia præcox* were, with several exceptions, between twenty and thirty years. The patients with manic-depressive psychosis had similar age distributions. A low circulating blood volume was found in patients with *dementia præcox* as compared with manic-depressive patients, whose circulating blood volume approached normal values. The schizophrenic patients had a blood volume per square metre of body surface of 2,609 cubic centimetres, as compared with 2,973 cubic centimetres in manic-depressive patients. The authors suggest that this diminution of the circulating blood volume may be due to a dysfunction of the hypothalamus. The average circulating blood volume in six patients with epilepsy was low. The circulating blood volume in involutional psychosis was lower than in schizophrenia. The values were similar in all patients. There was a great variation in blood volume in the patients with mental deficiency; but the average was lower than normal when the various patients, other than those with manic-depressive psychosis, such as patients with epilepsy, involutional psychosis, mental deficiency, paranoid state, senile dementia and psychopathic personality, were averaged as a total control group, 24 in number. Their average blood volume and plasma volume per square metre of body surface was found to be practically identical with that of the schizophrenic group, if anything a little lower.

The Electrical Activity of the Brain in Epilepsy.

F. A. GIBBS AND W. G. LENNON (*The New England Journal of Medicine*, January 21, 1937) have studied, by means of the electro-encephalogram, the electrical activity of the brain in epilepsy. The electrical fluctuations that can normally be led off the brain are, during a seizure, greatly modified. The type of modification is characteristic for different types of seizure, the difference being particularly marked between *grand mal* and *petit mal*. The records of fifty cases of *petit mal* epilepsy all showed a wave formation which is pathognomonic for this condition. The formation appears as a large slow wave followed by a fast spike, repeating itself about three times a second. This three-a-second wave and spike occur sometimes without a *petit mal* attack, but in such instances the voltage is relatively low and only one or two waves appear. These are called by the authors "larval" or "subthreshold seizures". From such seizures, which do not manifest themselves symptomatically and occur rather frequently in some patients, it is possible to make a diagnosis of *petit mal* epilepsy without having seen a clinically obvious seizure. Various parts of the cortex show characteristic modifications of this three-a-second pattern. *Grand mal* seizures are characterized by high voltage waves with a frequency of seven to twenty per second. As the seizure enters the clonic phase the fast waves are usually grouped together into slower waves, which tend to be synchronous with the clonic movements. After severe *grand mal*, there is a decrease in the electrical activity of the brain, so much so that the record appears flat. This period of flatness corresponds closely to the period of post-seizure stupor. By taking numerous simultaneous records from different parts of the head it is possible to detect the place of onset of a Jacksonian seizure. The authors were enabled in one case, by taking daily fifteen-minute records, to predict a *grand mal* seizure from the changes which occurred in the patient's record twenty-four hours before its onset.

The Knee Jerk in the Psychoses.

E. A. STRECKER AND J. HUGHES (*The American Journal of Psychiatry*, November, 1936) present the results of a study of the patellar reflex and its response to reinforcement in the psychoses. In manic-depressive, depressed and involutional patients presenting symptoms of agitation and depression it was possible to obtain a patellar reflex with a strength of stimulus which would be ineffectual with normal subjects. A similar low threshold for the knee jerk has been observed in senile patients and in cases of paresis with symptoms of depression. In addition, agitated and depressed patients, besides developing a maximal reflex response as the strength of the blow to the patellar tendon is slightly increased, give a greater reflex response than do other psychotic patients or normal subjects to a maximal stimulus. As the mental symptoms subside the size of the reflex decreases. The responses given by hypomanic patients are characterized by being variable and unpredictable from one to the next. In three cases the patellar reflex could not be elicited during the period of hypomania, but returned with the patient's clinical improvement. In one hypomanic patient the direct reflex could not be obtained, but contraction of the opposite quadriceps was observed. The reflex responses of the patients with schizophrenia resemble those of the normal. Agitated and depressed patients are unable to reinforce a maximal patellar response, although they still possess the ability to reinforce a small patellar reflex (threshold response). With improvement in the clinical condition the ability to reinforce the knee jerk returns. Similar findings are obtained in patients with senile psychoses and in others with paresis who presented symptoms of depression. The results obtained from the schizophrenic group show that the ability to reinforce the knee jerk was not altered by this psychosis. Hypomanic patients show wide variations in their responses. One was unable to reinforce the knee jerk; in others, reinforcement was effective, but varied from one moment to the next. Such variations may be related in some manner to the rapid shifting in the attention of these patients, since the knee jerk in normal subjects is known to be increased by diversion of the subject's attention.

Oral Prostigmin Therapy in Myasthenia Gravis.

R. S. MITCHELL (*The New England Journal of Medicine*, January 21, 1937) reports the results obtained in nine cases of *myasthenia gravis* treated by the oral administration of prostigmin. In every case the beneficial effect was greater than that obtained with any previous medication, including ephedrine, glycine and parenteral injection of prostigmin. The action comes on in about thirty minutes, reaches its height in about one hour, begins to wear off in two hours, and is usually gone in three to five hours. This beneficial effect was carefully controlled by the substitution of other drugs and inert substances without the patient's knowledge. Doses were used varying from 60 to 150 milligrammes a day in divided doses. The average dose was 90 milligrammes. Its advantages over the parenteral use of prostigmin are that it is taken by mouth and that it may be more easily given in frequent doses, fluctuations in symptoms being thereby avoided. The best results were obtained with five or six daily doses, the first before the patient rose in the morning and the last just before he retired at night. It is important that meals be taken about thirty to forty minutes after a dose. A carefully planned *régime* of prostigmin given orally, together with adequate rest, enabled most of the patients to return to a fairly satisfactory routine of daily life. Untoward effects observed with the drug were nausea, salivation, perspiration, dizziness, loose bowel movements, occasional muscular aches and pains, and rarely abdominal cramps, vomiting and diarrhœa. None of these symptoms lasted for more than fifteen to thirty minutes. Atropine and belladonna were effective in controlling the untoward effects of prostigmin, being given, because of theoretical considerations, in the smallest effective dose. Other drugs were used simultaneously with the oral administration of prostigmin. Ephedrine seemed to add nothing to its effect. In five of the nine cases potassium chloride appeared to act as an adjuvant. No indication of increasing tolerance to the drug, of diminution in degree or frequency of spontaneous remissions or of more rapid progression of the disease was observed.

Special Abstract.

HYPOGLYCÆMIC SHOCK TREATMENT IN SCHIZOPHRENIA.

DURING recent months hypoglycæmic shock therapy in schizophrenia has attracted a good deal of attention. Two special abstracts on the subject are published hereunder. The first, prepared by Professor W. S. Dawson, of the University of Sydney, is taken from a publication by the Board of Control (England and Wales), published by His Majesty's Stationery Office. The second, prepared by Dr. P. Guy Reynolds, of the Mental Hospital, Mont Park, Victoria, is taken from an article by B. Berglas and Z. Sušić, published in the *Psychiatrisch-neurologische Wochenschrift* of November 28, 1936.

Report by I. G. H. Wilson.

To the temporary revival of contact with the environment in certain cases of *dementia præcox* under the influence of carbon dioxide, and the more lasting improvements which have been claimed after narcosis by "Somnifaine", "Nembutal" and other drugs, there has been added another therapeutic measure concerning which the English Board of (Lunacy) Control has issued a report. One of the medical commissioners of the board, Dr. Isabel Wilson, visited Vienna and Berne for the purpose of seeing the treatment and assessing the results which have been claimed. This method appears to have been instigated by the observations of mental and neurological changes observed in a case of schizophrenia after hypoglycæmic coma, which were published by Dr. H. Torp in a Norwegian medical journal in 1932. For some time insulin and sugar have been administered to mental patients with a view to improving their general nutrition, and it may be presumed that Torp's observations were made on such a case. Then Dr. Manfred Sakel, of Vienna, who had been using insulin in the treatment of deprivation symptoms in cases of drug addiction, decided to repeat Dr. Torp's isolated success by inducing hypoglycæmia in a series of cases. Dr. Sakel is in charge of this special treatment in the Psychiatric Clinic in Vienna and has recorded his observations in a book which is to be translated into English. Professor Pötzl, who is the head of the clinic, makes a diagnosis beforehand according to Kraepelinian criteria, and claims that 60% to 70% of remissions are obtained by this method in contrast to 25% to 30% which may be expected to occur spontaneously. Such a claim by a psychiatrist of standing in an unfavourable disease clearly merits the closest attention. Sakel and Dussik, in a series of 104 cases, claim 82·6% of remissions (full, good or fit for work) in cases with under six months' history, and 45·7% of successes in cases with a history of more than six months. Kraepelin indeed estimated complete remissions at only 12% and stated that even these did not last for more than from three to six years. It may be recalled that Kraepelin referred to the weakening of activities and emotional dulness, and the failure of volition and of ability of independent action. The essential feature of schizophrenia, according to the Kraepelinian definition, is a slow deterioration occurring in adolescence or early adult life. Dr. Wilson found that the majority of patients had a history of mental aberration extending over several months, only a small proportion had displayed an acute onset, and a few might more correctly have been considered as suffering from confusional psychosis. It is natural that early cases should be preferred, but those of several months' or even years' duration are not excluded in Vienna. Further, the patient should be afebrile and free from myocardial weakness or other cardio-vascular disease. Such conditions, however, are not common in schizophrenia at the usual age of onset.

Method.

Injections of insulin are given daily or at longer intervals in doses sufficient to induce hypoglycæmic coma and are repeated until it is clear that no beneficial after-effects occur. The treatment is divided into three phases: (i) After fasting twelve hours the patient receives an initial dose of from 15 to 30 units of insulin and the dose is increased from 5 to 10 units daily until an amount is reached, on an average 60 to 80 units, which is productive of insulin shock. (ii) In the second phase the shock dose is repeated daily for six days per week over a period of a month to six weeks. The insulin is omitted not only on the seventh day, but also on the day following a severe epileptiform attack. (iii) After the completion of the second phase, in those cases in which beneficial effects follow the insulin shock, it is usual to continue the administration of insulin in doses smaller than the shock-producing amount until the patient leaves hospital.

It has been found convenient to treat patients together up to the end of the second phase in groups of not more than ten, so that they can remain under the close supervision of the medical staff while in a state of hypoglycæmia.

If the first injection is given at 7 a.m., the patient will be out of his hypoglycæmia and ready to take a meal by midday.

Symptoms during the Second (Shock) Phase.

Coma may be preceded by sweating and hunger, which sometimes is accompanied by excitement and rarely by violent attempts to get food (hunger riot). The pulse rate may be quickened or slowed. The treatment should be interrupted if the pulse rate falls below 40. From being drowsy, the patient passes into coma, in which condition, barring complications, he is allowed to remain for as long as a couple of hours. While he is in coma, the light cutaneous and tendon reflexes may no longer be elicited. Should a plantar response be obtained, it will be extensor. The patient is pale and may sweat and salivate profusely. Inhalation of saliva must be guarded against. The patient's temperature may drop below the range of an ordinary clinical thermometer. Respirations may become shallow and irregular. Muscular twitchings and restlessness are common. The patient may even become difficult to control. Epileptiform attacks are liable to occur at any time from the onset of hypoglycæmia until after the patient has had a meal. Laryngeal spasms may be productive of intense cyanosis, and in such a case a small tube should be passed into the trachea without delay.

Termination of Hypoglycæmic Coma.

If the patient is willing and able to swallow, he is given 150 to 200 grammes of glucose (cane-sugar is quite adequate) in milk or tea, otherwise sugar in solution must be given via a nasal tube, and in cases of emergency glucose must be administered intravenously. Ampoules of 33% glucose are kept handy, and up to 400 grammes may be given. A patient may become fully awake out of coma within ten minutes from the time that the administration of intravenous glucose is begun. A few drops of a 1 in 1,000 solution of adrenaline may be given subcutaneously as part of the emergency termination of hypoglycæmia. Adrenaline seems to be particularly effective in checking spasms and epileptiform attacks.

To summarize, hypoglycæmia should be terminated when the following conditions arise: (*a*) rapid pulse of poor quality, fall of rate below 40 beats per minute; (*b*) laryngeal spasms with cyanosis; (*c*) epileptiform attacks, when adrenaline should be given subcutaneously and glucose intravenously without delay; (*d*) very shallow or irregular respirations. Intense pallor may also be considered an indication for termination.

Armamentarium.

The following instruments and drugs comprise the interruption outfit which should be kept ready for immediate use. A trolly may be specially fitted for the purpose.

1. Injection syringe, at least ten cubic centimetres.
2. Injection syringe, at least two cubic centimetres.
3. Six intravenous needles.
4. Three needles for intramuscular injection.
5. One box of ampoules of 33% glucose (Osmon).

6. Five ampoules of adrenaline, 1 in 1,000.
7. "Kardiazol", lobelin and caffeine in ampoules.
8. Files for opening ampoules.
9. Lint and ether for disinfection.
10. Band or tube to arrest venous circulation.
11. Two mugs with strongly sugared tea, milk or water (150 to 200 grammes sugar).
12. Funnel and tube.
13. Glycerine or liquid paraffin.
14. Gag in case of tongue-biting.
15. One glass syringe, 150 cubic centimetres.
16. Strips of litmus paper.
17. One dessertspoon.
18. Sphygmomanometer.

Dangers.

Every patient who is in the hypoglycæmic state is in danger of his life, although the ready application of remedies offers a reasonable safeguard against a fatal termination. Nevertheless, the mortality of the treatment is three per two hundred cases in Vienna. Myocardial degeneration had best be considered a contraindication. For this reason the state of the heart and vessels should be examined with special care in adult and middle-aged patients. But *dementia præcox* is essentially a disorder of adolescence and early adult life, so that few cases should be rejected on account of cardio-vascular disease. By completion of the treatment before midday undesirable after-effects, such as relapse into coma (after shock) can be dealt with promptly. One or two patients treated earlier in Vienna, who had been receiving injections of insulin throughout the day, died in coma at night when apparently merely asleep. The treatment, even without these complications, is attended by some discomfort. Before the onset of coma the patient experiences hunger in a fairly intense form and he also feels cold and miserable. On coming out of coma, he may be unpleasantly perplexed and confused. Fortunately there is an amnesia for the more dramatic events which may occur during coma. It is desirable that patients be screened from each other while still remaining under the observation of the doctor in charge. No ill-effects, either physical or mental, have been noted to persist after the completion of the treatment.

Effects of Treatment.

The outstanding beneficial effects on the psychosis are quietness and return of partial or complete lucidity or insight. In favourable cases both lucidity and insight, which have become manifest during the second phase of the treatment, persist when the patient is no longer under the influence of insulin. It may, however, happen that throughout the treatment or in the later stages the psychosis becomes more active and uncontrolled whilst the patient is hypoglycæmic. It is impossible to predict how the patient will react in the hypoglycæmic state—he may be excited one day, calm the next, and have epileptiform attacks the day after. Hence the need for constant and careful observation, more particularly throughout the second phase.

Viennese workers consider that paranoid schizophrenia offers the best prognosis under this treatment, that patients with katatonic excitement and stupor display a less steady progress to normality, whilst patients with depressive hypochondriacal delusions have the least favourable outlook.

The staff of a Swiss clinic visited by Dr. Wilson would not venture any opinion as to the probable outcome before observing the immediate effects of treatment.

That this method still lacks a scientific basis need hardly be advanced as an argument against it. Even the malarial therapy in general paralysis was tried on slender grounds, and the results far exceeded expectations.

Sakel speaks of the interruption and breaking down of abnormal paths traversed by nervous impulses in the brain, after which the tracks can be "polarized" in normal directions through treatment.

Professor Georgi, of Berne, questions the use of the term "shock" and prefers to speak of "high dosage insulin treatment". Like high dosage protein therapy, the induction of hypoglycæmia certainly provokes severe reactions, but there is as yet no scientific reason for putting these into the category of "shock". Professor Berze, of Vienna, is more inclined to emphasize the emotional effects of the treatment, that is, the stirring up of latent emotions and the encouragement of the physician-patient relationship, which has long been the aim of psychotherapy in *dementia præcox*.

Dr. Wilson is, of course, fully alive to the difficulty of forming a diagnosis and estimate of probable cause and outcome in *dementia præcox*, so that claims regarding treatment must be regarded with caution. On the other hand, as she points out, any measure which causes even temporary benefit is worth closer investigation, and when treatment is followed by lasting improvement and even recovery in unpromising cases, one is all the more encouraged to give it a trial. As one of the medical staff of the Swiss clinic said to Dr. Wilson: "If, then, improvement follows in a case we have considered hopeless, this means more than the most beautiful statistics." Dr. Wilson herself comments in the following terms on the lucidity which may appear after injections have been instituted: "When it occurs, it makes on the observer and sometimes on the patient a very strong impression that there is something in the nature of a direct attack on the basis of the psychosis going on."

Article by Berglas and Sušić.

B. Berglas and Z. Sušić have treated 85 psychotic patients (83 schizophrenics and two chronic alcoholics with a schizophrenic clinical picture) by means of insulin hypoglycæmic shock. The group comprised 34 recent and 51 old cases. (The authors, following Dussik and Sakel, designate as "old" those cases in which the signs of disease have been present for longer than six months.) An attempt was made to divide the old cases into two groups: (*a*) a deteriorated group, in which the patients were quite without prospects of recovery; (*b*) a non-deteriorated group, in which the patients still exhibited definite psychical responsiveness. Following treatment in 70% of the recent cases good "social" remissions occurred, a proportion of remissions which so far exceeds that obtained with earlier methods of treatment that it is impossible to deny the influence of the insulin therapy on the schizophrenic process. The results obtained with the old cases demonstrated the importance of the division of the cases into "deteriorated" and "non-deteriorated". Of the 28 non-deteriorated patients, six (that is, 21·43%) showed full remissions and two good "social" remissions; on the other hand, of the 23 deteriorated patients, only one (4·35%) showed a good "social" remission. Both the chronic alcoholics, who over years had failed to respond to any treatment, had a full remission and were discharged, cured, to their homes. In the majority of the old cases the patients received at the most two months of treatment. The authors' experience with odd cases in which treatment was continued for a longer period, has convinced them that if no improvement occurs during the first two months there is no prospect of further treatment producing it. Coma was terminated in the majority of cases by the intravenous injection of from 20 to 40 cubic centimetres of a 33% solution of glucose. The intravenous method was used in order to avoid various undesirable sequelæ which were observed when the nasal tube (as recommended by Sakel) was employed, but which were not observed when the glucose was administered intravenously. Many patients following deep coma or an epileptiform fit in the morning had an afternoon rise of temperature, which ranged from 37·5° to 40° C., and which usually lasted till the following afternoon. In this event treatment was suspended for one or two days. Epileptiform fits were easily terminated by the intravenous injection of glucose. No harmful after-effects were shown by two patients in whom the seizures, beginning during coma, passed on after the termination of coma to a condition of *status epilepticus* lasting several hours. Bronchopneumonia was the cause of the two deaths in the series.

British Medical Association News.

SCIENTIFIC.

A MEETING of the Victorian Branch of the British Medical Association was held at the Austin Hospital for Cancer and Chronic Diseases, Heidelberg, on Wednesday, April 21, 1937. The meeting took the form of a number of clinical demonstrations by members of the honorary medical staff of the hospital.

Involuntary Movements.

DR. E. GRAEME ROBERTSON demonstrated patients and also films exhibiting various types of involuntary movements. Dr. Robinson showed a film demonstrating the rapid, jerky, irregular, purposeless, constantly changing movements of the face, limbs and trunk characteristic of rheumatic chorea in which toxic changes had been found in striatal cells, particularly in the caudate nucleus and putamen. The changes were apparently reversible, for, in contrast to all other types of involuntary movement, recovery occurred. The film also showed a patient suffering from Huntington's chorea, in which changes in the cortical cells explained the mental deterioration, "a gradual concentric diminution of the patient's horizon within the vision of the patient". The violent swinging movements of the limbs of one side of the body characteristic of "hemiballismus" were next demonstrated by Dr. Robertson in a film of an elderly woman in whom the condition was of sudden onset. After death the lesion had been found to be a degeneration of the *corpus luysi* of the opposite side, due apparently to a vascular lesion. Dr. Robertson said that the different structures involved in chorea supported Kinnier Wilson's belief that the lesion was one of a cerebello-striatal-cortical pathway.

Dr. Robertson also demonstrated the slow, purposeless, twisting movements of distal parts of the extremities characteristic of athetosis. It was produced by lesions of different types in the *corpus striatum* (*état marbré*, congenital bilateral athetosis, associated with pyramidal disease in an atrophic sclerosis; *état dyzmyélinque*, when the disease, associated with rigidity, developed during adolescence as the result of vascular lesions in advanced life *et cetera*). Dr. Robertson said that dystonic movements were slow twisting movements involving the trunk and proximal parts of the limbs, producing slow writhing distortions. They were often associated with the athetosis, as in the child shown, the lesion probably being in the *corpus striatum*. He also said that in one particular type, *dystonia musculorum deformans*, widespread lesions had been found in the post-central cortex, neostriatum and, perhaps coincidentally, in the ganglion cells of many cranial nerves.

Dr. Robertson showed a male patient, twenty years of age, who had been a six months' premature baby; owing to difficulty with feeding he had been nourished upon alcohol for the first month of his life. Definite disorders of movement were noticed at nine months of age. He was mentally backward and displayed the grossest of torsion movements, particularly of the neck and trunk with some fixed deformity. In the limbs slow accesses of tone produced writhing, twisting movements. Dr. Robertson said that the patient had a bilateral pyramidal lesion more definite on the right side and that he might therefore be regarded as suffering from Little's disease, with athetosis and more widespread dystonic features. Dr. Robertson showed some films depicting the association of athetosis, dystonia and spasmodic torticollis; the last mentioned was regarded as a fragment of dystonia.

Dr. Robertson also showed a male patient, ten years of age, who was suffering from chorea-athetosis. The boy showed gross movements which had been present from a very early age. There were grimacing, jerky, irregular, constantly changing, sometimes violently swinging, and twisting movements of his limbs, chiefly of the right upper extremity. Certain elements suggested the chorea which occurred in vascular lesions of the *corpus luysi*, and such a location of the lesion would be favoured in this patient by the left-sided, third nerve palsy. Dr. Robertson also showed a film of a younger child demonstrating similar movements; the increase of the voluntary effort in increasing the movement was very apparent.

Dr. Robertson said that in *paralysis agitans* the regular rhythmical alternating contraction in opposing muscular groups generally commenced in one hand and then spread to the other limbs, usually being associated with characteristic rigidity. Pathologically the lesion was found in the *corpus striatum*, most observers believing that the large ganglion cells of the *globus pallidus* degenerated. In the post-encephalitic variety there was destruction of the cells of the *substantia nigra*.

Dr. Robertson showed a woman, thirty-seven years of age, who had suffered from a typical attack of *encephalitis lethargica* fifteen years earlier. She was an example of a patient with Parkinson's disease. The extreme rigidity of opposing muscular groups and the absence of reciprocal relaxation on attempted movement produced almost complete paralysis of voluntary movement in this patient. In horrible contrast was the uncontrollable involuntary movement tremor of her lower lip and hands and the intermittent forced upward rotation of her eyes (oculogyric crisis). This patient was unable to speak and indicated her wants by blinking in response to questions. Dr. Robertson said that this type of tremor was present at rest and in early cases was diminished by voluntary effort or movement, but later the ability to inhibit it progressively diminished.

Dr. Robertson remarked that the next two patients were of great interest and had been admitted with the diagnosis of athetosis and "hereditary Parkinsonism".

A boy, sixteen years of age, had been unable to move properly from a very early age. His general appearance and unintelligible speech gave the impression of marked mental deficiency which had been contradicted by his ability to read and write in spite of difficulties. Examination revealed nystagmus, absence of palatal movement and pharyngeal reflexes, although sensation appeared intact. Dr. Robertson said that the child was motionless at rest, but that the slightest muscular contraction produced a rapid rhythmical tremor of the segments of the limb involved. When standing the movements were sometimes so coarse as to threaten his balance; his speech showed the combination of effects of these lesions; it was grossly dysarthric and nasal.

A male, aged seventy-three years, stated that he had never been able to hold his hands still whenever he endeavoured to use them. The same difficulty was present in the lower limbs. On examination the limbs were found to be motionless when at rest, but initiation of any movement, even postural contraction, produced a coarse, rapid, rhythmical tremor, increasing on voluntary movement as the goal was reached. A similar type of tremor affected the movements of the head, trunk and lower limbs and interfered with walking in an amazing way. Examination also revealed diminution of all forms of sensation over the whole of the body. Dr. Robertson showed a film demonstrating a similar tremor of both hands in a patient suffering from an otherwise typical attack of acute infective polyneuritis.

Dr. Robertson said that in 1904 Gordon Holmes had described a number of clinical cases in which the common factor had been a tremor similar to that shown by these two patients. He had described the tremor as follows: first, it ceased during relative cortical inactivity; secondly, the tremor increased with cortical activity; thirdly, it could not be controlled voluntarily; fourthly, the cortico-spinal system must be relatively intact. Associated physical signs had suggested, and the cases which came to autopsy confirmed, an involvement of either the superior cerebellar peduncle or the red nucleus or the rubro-spinal tract. The associated signs in the two patients described were of interest in this connexion.

In conclusion, Dr. Robertson stated that it was impossible to deal with the many problems surrounding the

production of involuntary movements. It was probable that activity of the cerebral cortex, initiating movement, stimulated activity of the *corpus striatum*, cerebellum and other brain-stem nuclei, which, by their influence upon the lower motor neurones through extrapyramidal pathways caused the eventual smooth synthesis of properly coordinated voluntary movement. A pathological state of any part of this controlling mechanism produced some disorder of voluntary movement, be it ataxia, rigidity or voluntary movement.

Methods of Muscle Examination in Poliomyelitis.

DR. C. H. HEMBROW demonstrated the method of examination of muscles to determine the amount of their disability. In lower motor lesions, paresis of a muscle, he said, was more often encountered than complete paralysis. It was important to be able to determine the exact degree of weakness both for the purpose of accurate record and to avoid the error of assuming on the one hand that a muscle which could not produce an action on demand was completely paralysed, or on the other hand that a muscle which could apparently act strongly was quite normal.

Dr. Hembrow said that one could use a spring balance matched against the muscle to determine its actual strength, but this method was tedious and not suitable for everyday use. He used several cases of quadriceps weakness of varying degrees to illustrate the method of using gravity as a measuring stick. He said that by asking if the quadriceps could extend the knee against gravity, two groups could be established: those that could and those that could not extend the knee. In the latter case, when the quadriceps failed to produce extension against gravity he gradually eliminated gravity by turning the patient on the side and if no action was obtained, by turning him over onto his face, when gravity would commence to aid the action. Dr. Hembrow said that in this way a position of the limb was obtained in which the quadriceps could act, and this was marked on the chart with an arrow which indicated the position. Dr. Hembrow said that this was valuable information both for record purposes and also in order to discover in which position one could give reeducative exercises commensurate with the ability of the muscle and yet so that it would not be fatigued. In the other group, that comprising those muscles which could act against gravity, there were three subdivisions: those that could act against a little resistance, those that could overcome much resistance, and finally those muscles that were normal. Dr. Hembrow said that a muscle was considered normal in strength when it could carry out normally the maximum test expected of it; this in the case of the quadriceps was to stand on one leg and bend and extend the knee several times. In the case of the calf it was to hop on one leg across the room. Dr. Hembrow also illustrated maximum tests for other muscles. The methods of testing abdominal muscles and the varieties of trick movements were demonstrated.

Carcinoma of the Lung.

DR. ERIC L. COOPER showed a series of skiagrams, case histories and specimens illustrating the clinical features of carcinoma of the lung. He said that carcinoma of the lung most frequently arose in the larger bronchial passages and might give rise in the lung to a large mass that might extend outwards from the hilum; specimen number 1325.Z. was shown to illustrate this type of tumour. The collapse of the right lung contrasted with the emphysema of the opposite lung. The mass might be of relatively large size before symptoms arose. Dr. Cooper said that a persistent irritating cough with dyspnœa was complained of by the patient, and there might be also definite clubbing of the fingers before the development of bronchiectasis or empyema.

Dr. Cooper showed two skiagrams, number 3443, showing a massive growth in the upper lobe of the right lung, and number 3359, showing a carcinoma extending from the hilum; secondary nodules were also seen in the opposite lung. Dr. Cooper remarked that more frequently the carcinoma fungated and blocked the bronchial lumen; the lung tissue distal to the obstruction collapsed and the mediastinum was displaced towards the side of the lesion; dyspnœa became extreme and a dull pain might be present in the chest.

Dr. Cooper showed a skiagram, number 3753, showing definite displacement of the trachea to the left following occlusion of the main bronchus by a carcinoma. When fungation and ulceration of the newgrowth occurred, the cough was associated with sputum which was frequently blood-stained. The intimate mixture of blood and bronchial mucus gave the so-called prune juice or red currant jelly sputum. Because of a cough with blood-stained sputum many of these patients were admitted to sanatoria with a diagnosis of tuberculosis.

Another film shown by Dr. Cooper was number 3753, that of a patient who for a year before the correct diagnosis was made had been treated as tuberculous by replacement pneumothorax, which enabled the outline of the carcinomatous mass to be seen. Dr. Cooper said that collapsed lung tissue was infected from the bronchial passages and a local area of collapse in one lobe was replaced by an abscess cavity, or alternatively a mass of neoplastic tissue broke down, discharged the *débris* into a bronchus and became secondarily infected. Any lung abscess in middle or old age should be suspected of being primarily a neoplasm of the lung.

Specimen number 643.Z. showed a large abscess cavity in the left upper lobe. The neoplastic origin of this was not suspected during life, and even at the *post mortem* examination it was looked upon as a simple abscess. Microscopic examination of the wall of the abscess showed active adenocarcinomatous tissue. Dr. Cooper said that in other patients occlusion of the bronchus with infection gave rise to a local bronchiectasis with a cough, fœtid purulent sputum, rapid loss of weight, recurrent hæmoptyses and clubbed fingers. This condition was shown in a skiagram, and specimen number 71.Z. showed a large growth at the hilum with partial blockage of the bronchus and an extensive bronchiectasis in the lower lobe. Dr. Cooper pointed out that extension of the newgrowth frequently occurred to involve the pleural surface of the lung. Pleural secondaries with superadded infection gave rise to empyema.

Another specimen, number 816.Z., showed an extensive carcinoma of the lung. The patient had been admitted with dyspnœa and a dry cough. The empyema had been discovered and at autopsy the cause was found to be a carcinoma of the lower lobe bronchus. Dr. Cooper said that the most common mode of spread of carcinoma was to the lymphatic glands of the mediastinum. The enlargement of these glands gave rise to extreme dyspnœa, substernal pain and occasionally hoarseness due to recurrent nerve paralysis.

Another specimen, number 1247.Z., and skiagram T, illustrated the lesion in a patient who had been examined eighteen months before his death. At the first radiological examination with lipiodol the lung fields had been clear. One year later, however, dyspnœa and aphonia were the main symptoms on the patient's admission to hospital, and radiological examination with lipiodol had shown a bronchial obstruction. The specimen showed the growth and the large mass of glands compressing the bronchus and trachea; glands could also be felt in the neck. Dr. Cooper said that extension to the cervical glands was relatively common and patients occasionally presented themselves with a mass in the neck which was due to this secondary extension.

Dr. Cooper showed another specimen, number 10464 F4., showing a large carcinoma with secondary cervical glands. He pointed out that the axillary glands were involved when the pleura was invaded. He said that secondary nodules frequently appeared in the opposite lung and gave rise to increased dyspnœa, hæmoptysis and rapid loss of weight. Another specimen showed multiple secondary nodules in the lung tissue, and skiagram number 3347 showed a massive carcinoma of the left lung with secondary nodules in the right. Dr. Cooper said that extension by the blood stream occurred early in carcinoma of the lung, and secondary nodules were common in the brain, in the bones and in the liver.

Another skiagram shown, number 3807, was that of a patient with a *cauda equina* lesion and primary malignant disease in the lung. Frequently the symptoms of the secondaries arose before the primary growth declared itself, and patients were admitted to hospital with mental disorder due to brain nodules or pains in the limbs or back due to bone secondaries.

Dr. Cooper said that the procedure of investigation in a patient suspected of carcinoma of the lung included: (*a*) a detailed history, with special reference to symptoms of pain, dyspnœa out of proportion to the physical signs in the chest, blood-stained sputum, loss of weight and general cachexia; (*b*) examination of the patient with close attention to the position of the trachea in the neck, the expansion of one side of the chest compared with the other, the presence of axillary or cervical glands and a search for evidence of metastatic nodules in the brain, liver, bones or elsewhere; (*c*) screen examination of the chest, recording the position of the mediastinum and its movements during respiration; (*d*) skiagrams in the postero-anterior, lateral and oblique positions where indicated; (*e*) examination of the sputum for tubercle bacilli; (*f*) the application of the Wassermann test to the blood; (*g*) bronchoscopic examination to determine bronchial block and if possible to remove a portion of a fungating tumour for microscopic section; (*h*) lipiodol injection to show bronchial obstruction or bronchiectasis; (*j*) aspiration of pleural fluid with air replacement to outline a carcinomatous mass in the lung; (*k*) excision of cervical or axillary gland for microscopic section.

DR. R. D. WRIGHT, who had prepared the specimens referred to in the report of Dr. Eric Cooper's demonstration, attended and indicated the pathological features of interest.

Medical Aspects and Results of Thoracoplasty.

DR. J. BELL FERGUSON said that before thoracoplasty was undertaken, close cooperation between the physician, surgeon and radiologist was required, and that each patient should, if possible, undergo a period of a few weeks' observation from this trio. The physician should realize that the success of the operation depended entirely on the selection of the cases and on correct interpretation of suitable indications. Dr. Ferguson said that to clear the ground it might be well to mention the chief contraindications: (*a*) A mobile, soft mediastinum was an absolute contraindication, as it would fail to assume the burden of one-sided pressure, and mediastinal flutter would ensue. This caused displacement of the heart, interfered with its great vessels, and much dyspnœa resulted. (*b*) The age of the patient should be considered. Elderly patients or most patients over forty-five were likely to have costal cartilages too rigid to allow suitable collapse. (*c*) Conditions in the contralateral lung other than tuberculosis were contraindications—examples were bronchitis, emphysema, asthmatic symptoms, basal congestion or marked pleural changes. (*d*) Tachycardia, dyspnœa, cyanosis were very important contraindications if they were due to a weak and failing myocardium. If they were due, however, to fibrotic traction in the mediastinum, then thoracoplasty might give relief. (*e*) Established tuberculous enteritis was usually regarded as a contraindication. (*f*) Fever was also regarded as a contraindication if long-standing and with marked remissions.

The objects of the operation were exactly those of artificial pneumothorax, namely, rest, immobilization and relaxation of the affected lung. In choosing a case for artificial pneumothorax a surgeon was concerned with the state of the pleura chiefly, but for thoracoplasty with the state of the lung itself. Dr. Ferguson said that the character of the disease was more important than the extent and the presence of cavities. Above all, the lesion must be one of the proliferative type, and fibrosis, not exudation, should be definitely prominent; further, the fibrosis should involve and secure a fixed mediastinum. Dr. Ferguson said that, bearing in mind the facts already stated, one might consider as suitable candidates for thoracoplasty such patients as: (*a*) Every patient with a chronic unilateral condition up to the age of forty-five, whose lung could not be made to collapse by other means; limited quiescent fibrotic lesions were allowable in the contralateral lung. (*b*) Every patient with a chronic unilateral condition, with cavities having thick and rigid walls. (*c*) Patients with uncontrollable hæmoptysis, even in the presence of a contralateral lesion, but not if cavities were present. (*d*) Earlier consideration should be given to artificial pneumothorax cases in which partial collapse only was being attained. (*e*) Apart from these somewhat anatomical and pathological criteria, the individual patient should be assessed as far as mental outlook, resistance, work and after-care were concerned, and the whole evidence should be weighed carefully.

Dr. Ferguson said that with regard to the results of thoracoplasty, according to their combined figures, Archibald and Bull in America, Gravesen in Denmark, Franke, Kaystrom and Scherdtler in Germany, claimed that of 1,106 patients 42·3% with thoracoplasty had been able to work without signs of disease for at least a year. Sauerbruch, of Berlin, claimed 70% to 80% of cures in conservatively chosen cases, while in all classes of cases in more recent years that percentage was still over 40. Dr. Ferguson said that, taking forty patients from 1930 to 1936 in Melbourne, 70% were alive and 30% dead, and that of the 28 patients alive only one was worse and the others were well. Of these patients, 89% had shown improvement in the blood sedimentation rate, and that 53% of those alive had lost the positive sputum or were "tuberculous negative". Roughly, he said, out of 100 patients, including good, moderate and bad risks, one might expect 25 to die soon after operation, 25 to derive some benefit and 50 to be definitely improved. Dr. Ferguson illustrated all his remarks with skiagrams from different cases.

DR. H. C. TRUMBLE, in collaboration with Dr. Bell Ferguson spoke on the surgical aspects of thoracoplasty. He also spoke of the difficulties encountered and of the position of the patient on the operating table. Dr. Trumble pointed out the value in some cases of first resecting the upper three ribs, as it was then possible to terminate the procedure if sufficient apical collapse were obtained. On the other hand, if the lower ribs were resected first it was necessary to complete the thoracoplasty in order to obtain any collapse of the hemithorax. Dr. Trumble demonstrated instruments of his own design, consisting of special rib shears and malleable periosteal elevators. The difficulties in complete closure of an empyema cavity by thoracoplasty were referred to and a patient was shown in whom such closure had been obtained by combination of constant negative pressure with thoracoplasty. Dr. Trumble showed one patient after a complete thoracoplasty; the patient was well after discharge from hospital, with no sputum and no cough. He also demonstrated skiagrams of the different cases.

Tuberculosis of the Spine.

DR. C. A. M. RENOU showed several cases illustrating uncommon and interesting spinal pathological conditions. He showed a girl, aged twenty-two years, who had recovered from acute poliomyelitis of the first three cervical vertebræ, and who showed full and painless movement of the head and neck.

Another patient shown by Dr. Renou was a middle-aged woman, suffering from Hodgkin's disease, who had a dorsal kyphosis due to a radiologically demonstrable Hodgkin's deposit in the body of the tenth dorsal vertebra with collapse.

A secondary carcinomatous deposit in the same region from a primary malignant breast was then shown for the purpose of comparison with the previous case.

Dr. Renou then demonstrated a healing tuberculous lesion in the bodies of the third and fourth lumbar vertebræ in a young woman. He also showed a patient, a middle-aged male, with *tabes dorsalis*, who presented a painless bony deformity of the fourth and fifth lumbar vertebræ which showed the characteristic radiological appearances of Charcot's disease of the spine.

DR. G. E. FOREMAN, in conjunction with the demonstration by Dr. C. M. Renou, showed a number of skiagrams of lesions of the spine, consisting of tuberculous foci

or appearances due to other causes which in some respects might be confused with tuberculous lesions.

A patient, thirty-three years of age, had lumbar puncture performed in 1934 on account of attacks of headache and vomiting and had complained of lumbar pain subsequently, but the skiagram taken in 1936 showed the appearances of early tuberculous disease of the fourth and fifth lumbar vertebræ; tubercle bacilli had been recovered from the urine.

Another patient had had excision of tuberculous glands of the neck performed in 1931, of the left testis in 1934, and of the right epididymis in 1935. In June, 1936, a painless mass had developed insidiously in the right loin. The skiagram showed the presence of a tuberculous lesion between the third and fourth lumbar vertebræ and of a large psoas abscess.

In another skiagram could be seen a lesion of the fourth, fifth and sixth cervical vertebræ in a female patient twenty-four years of age, who for seven months had complained of a stiff neck and severe pains in the right arm, in the area of the fifth and sixth cervical segments. The serum failed to yield the Wassermann reaction, and, though the lesion, which was regarded as tuberculous, had progressed unfavourably at first, it had since shown signs of healing and the root pains had become considerably less.

Dr. Foreman showed the radiographic evidence of the presence of tuberculous disease of the spine in a male patient twenty-six years of age, associated with an enormous retro-pharyngeal abscess extending into the thorax. At autopsy on this patient it was found that long spicules of bone projected from the anterior surfaces of the cervical vertebræ into the abscess cavity.

A female patient, forty-five years of age, had been admitted to hospital with pulmonary tuberculosis and lumbo-sacral root pain. In a skiagram taken in May, 1935, only the lower half of the fourth lumbar vertebra appeared to be intact, and in a film in March, 1936, the fourth lumbar vertebra had disappeared entirely. At autopsy it was found that the body of the fourth lumbar vertebra was replaced by a bag of pultaceous material which, on histological section, was regarded as adenocarcinomatous material, though no primary lesion was discovered.

A male patient, sixty-seven years of age, who had been admitted to hospital with right-sided pleural effusion and congestive cardiac failure, developed pain and increasing kyphosis over the tenth thoracic vertebra. The serum yielded a triple positive Wassermann reaction and paraplegia became complete, with severe root pains. At autopsy the body of the tenth thoracic vertebra was replaced by an abscess cavity and the other organs showed evidence of the presence of syphilis.

Another interesting film shown by Dr. Foreman was that of a patient admitted to hospital with the diagnosis of quiescent pulmonary tuberculosis, who complained of some pain in the lumbar spine. The skiagram presented the appearances of a lesion of the *nucleus pulposus*, and the radiograms taken over a period of three years showed that the appearances had remained unchanged.

Ophthalmological Cases.

DR. LAWRENCE DUNCAN showed a boy, nineteen years of age, who for some months had noticed failure of vision of the left eye. The vision of the right eye was found to be $^6/_6$ and that of the left $^6/_{12}$. There was atrophy of both optic papillæ, and an examination of the visual fields showed a binasal hemianopic defect; the Wassermann test gave no reaction. A skiagram of the skull showed a narrow, dense, curved shadow behind and above the *dorsum sellæ*; it was thought to be a calcified segment of a spherical cyst.

Another patient shown by Dr. Duncan was a female, who had been fitted with the prismatic spectacles devised by Mr. McKie Reid, F.R.C.S., of Liverpool, to enable invalids doomed to spend long periods in a completely supine position to read with comfort. Dr. Duncan said that with these spectacles the patient's eyes were directed straight ahead, as though looking up at the ceiling, whilst reading a book resting on the chest. They were made so that they could be worn either over existing spectacles or fitted with the wearer's own correction.

Skiagrams.

DR. ALAN MACKAY showed skiagrams illustrating the various pathological changes in bones and lungs. The first case was that of a woman, aged thirty-one years, who had been admitted to hospital complaining of a limp and of pain in the thigh for several months. The films showed cystic degeneration in the neck and upper shaft of the femur, with deformity of the femoral neck. The cortex of the bone was eroded and the condition was diagnosed as fibrocystic disease undergoing malignant changes. After deep X ray therapy the bone regenerated considerably, the patient had since been discharged from hospital and had remained well for six months. Whilst in hospital she developed renal calculi.

Dr. Mackay showed in comparison the films of the femur of a man, aged fifty-nine years, demonstrating a typical osteogenic sarcoma, with new bone formation at right angles to the shaft and raising of periosteum.

Dr. Mackay also showed films of a woman, forty-five years of age, who had had a large mass in the axilla for about four months, showing dislocation at the shoulder joint, with fragmentation and partial destruction of the head of the humerus. The patient's blood gave a positive Wassermann reaction, and the diagnosis was either Charcot's disease or a gumma of the shoulder.

The skull films of a female congenital syphilitic patient, aged forty-two years, were also shown to demonstrate the typical frontal thickening, sclerosis and bossing. Films of the elbows and knees of a boy, eighteen years of age, suffering from a mixed parotid tumour (a type of tumour in which metastases were rare), showed metastatic deposits in the long bones at these joints. Dr. Mackay also showed some films of the legs of a renal dwarf, aged eight years, showing decalcification and bowing of the long bones, associated with the changes of rickets at the epiphyses.

He also showed other films illustrating hæmangioma of the lumbo-sacral spine, *osteogenesis imperfecta* and various congenital skeletal abnormalities. Amongst a number of chest films there were some illustrating the difference between a pneumothorax and a large tuberculous cavity occupying half the thorax.

Dr. Mackay also showed films of a young girl, aged twenty-two years, to illustrate the value of routine skiagraphic examination of the nursing staff. At the commencement of her training, two years before the meeting, her lungs had been normal, but at the routine examination, two weeks before the meeting, a patch of parenchymatous tuberculous infiltration, about one inch in diameter and showing evidence of activity, was demonstrated in one apex. The nurse had been working continuously and had not complained of any illness. The condition, Dr. Mackay said, had been discovered only in its early stages at the routine radiological examination.

NOMINATIONS AND ELECTIONS.

THE undermentioned has applied for election as a member of the New South Wales Branch of the British Medical Association:

Hiatt, Leslie Parker, M.B., 1933 (Univ. Sydney), 30, Lyons Road, Drummoyne.

The undermentioned have been elected members of the New South Wales Branch of the British Medical Association:

Gillies, Allan Douglas, M.B., B.S., 1935 (Univ. Sydney), c.o. Medical School, University of Sydney, Sydney.

Lee, John Russ, M.B., B.S., 1935 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

Lyne, Ronald George, M.B., B.S., 1935 (Univ. Sydney), Portland.

O'Neill, Niall Eugene, M.B., B.S., 1936 (Univ. Sydney), 168, Kurraba Road, Neutral Bay.

The undermentioned has applied for election as a member of the South Australian Branch of the British Medical Association:

Seymour, Stanley Liddelow, M.D.C.M., 1935 (Univ. McGill), 7, Pembroke Street, College Park.

The undermentioned have been elected members of the South Australian Branch of the British Medical Association:

Dorsch, Carl Emil, M.B., Ch.B., 1922 (Edinburgh), Berri.

Juttner, Colin Percival, M.B., B.S., 1935 (Univ. Melbourne), 19, Stirling Street, Tusmore.

Medical Societies.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held at the University of Adelaide on October 2, 1936.

Disinfection.

In a talk entitled "Recent Advances in the Study of Disinfection" MR. FRENCH outlined the development of the various methods of testing disinfectants for germicidal activity, and discussed briefly the disadvantages of the usual methods employed and the fallacies connected with the interpretation of the results of a phenol coefficient determination. Mr. French then described in some detail the factors which governed the action of germicides, and explained the necessity for determining the coefficients n, k and O, from which the behaviour of the germicide at different concentrations and temperature could be calculated.

In conclusion the speaker outlined the results obtained up to the present time from experiments which he was carrying out to study disinfection at the Faulding Research Laboratories. It was demonstrated that the effect of replacing the sodium ion in sodium ricinoleate with the mercury ion was to increase the germicidal activity of the compound enormously, and at the same time to reduce the concentration factor n to almost unity, thus allowing mercury ricinoleate to be diluted much more than sodium ricinoleate. Similarly it was noted that the effect of chlorinating tar oil was to increase germicidal activity in low concentrations, making the halogenated compound the more valuable germicide.

PROFESSOR J. A. PRESCOTT opened the discussion by asking if any work had been done to check the accuracy of the technique. Mr. French replied that the calculated result was found to agree very closely with the observed result.

PROFESSOR J. B. CLELAND asked if the speaker could say whether the presence of protein would have any effect upon the results obtained by this technique. To this Mr. French replied that he was not aware of any work having been done on this point. However, it was well known that the carbolic coefficient was affected by the presence of protein.

DR. H. K. FRY then observed that as the mercury ricinoleate had been made by double composition of $HgCl_2$ and sodium ricinoleate, it was possible that it was the $HgCl_2$ that was exerting the germicidal activity due to reversibility of the reaction. The speaker in reply pointed out that the n value of $HgCl_2$, calculated as ionised Hg was about 3, whereas the n value of mercury ricinoleate was almost unity. In view of this it was thought that the insoluble compound $(C_{17}H_{33}O_2)_2Hg$ was actually responsible for the figures obtained.

A MEETING of the Medical Sciences Club of South Australia was held at the University of Adelaide on April 9, 1937.

The Physico-Chemical Adjustment of the Blood in Congenital Heart Disease.

PROFESSOR SIR STANTON HICKS read a paper on work carried out intermittently during several years, partly in collaboration with C. Ingham Cox, M.Sc., on the physico-chemical adjustment in the blood of subjects with congenital heart disease. One case was unique in that the sole connexion between right and left sides of the heart was via a patent interventricular foramen. The results of the investigations, they claimed, indicated that the polycythæmia was essential for buffering excess hydrogen ions, and possibly not for ensuring a better oxygen supply, since the raised viscosity of the blood so increased circulation time as to lower the oxygen gradient to the tissues below that which would obtain without such extensive polycythæmia.

The authors suggested that over-breathing due to anoxia of the carotid sinus led to loss of base by the kidneys, and that the excess hæmoglobin then buffered hydrogen ions by means of the carbamino reaction recently discovered by Roughton and his colleagues at Cambridge. Otherwise it was difficult to account for such a physiological disability as was caused by the intense polycythæmia in an attempt to correct the very defect that it actually made worse. They reported in support of the carbamino theory of buffering in these cases: (*a*) the existence of a plasma hydrogen ion concentration of pH 7·1 without any signs of coma, (*b*) the causation of hyperpnœa after ten minutes' breathing of pure oxygen.

They also showed that daily intermittent oxygen breathing for a total of thirty minutes had enabled a patient to enjoy limited useful health for six years since her severe illness, with a red cell count of 8·7 million, and with an extremely grave prognosis. They support the statement of Campbell and Poulton that by oxygen inhalation the saturation of the blood could be raised to 90%.

DR. F. W. ARDEN said that if breathing oxygen at ordinary pressures was without effect, he wished to know how it could cause hyperpnœa in these cases if the action of oxygen was to facilitate unloading of carbon dioxide in the lungs and not in the tissues.

DR. W. J. O'CONNOR pointed out that, if the results were as reported, the explanation would lie in the rising percentage of oxygen saturation and consequent fall in the available reduced hæmoglobin, which was the reservoir for amino-compound buffer.

THE MEDICAL WOMEN'S SOCIETY OF NEW SOUTH WALES.

THE annual meeting of the Medical Women's Society of New South Wales was held at Sydney Hospital on March 24, 1931, DR. MARGARET HARPER, the President, in the chair.

Annual Report and Balance Sheet.

The annual report and balance sheet were presented and adopted. The balance sheet is published herewith; the report is as follows.

The Committee presents the following report:

Death of Member.—Dr. Lily Holt Macrimmon, who had only recently returned to Australia, passed away in the early part of the year.

Membership.—Eighteen new members have been elected during 1936, so that the total now stands at 106.

Balance Sheet, 1936-1937.

EXPENDITURE.	£	s.	d.
Notices, Stationery, Stamps, Petty Cash *et cetera*	7	7	9
Meetings (hire of hall, tips, suppers)	9	14	3
Annual Dinner	18	16	6
Subscription to Australian Federation of Medical Women	4	10	0
Wreath	1	1	0
	£41	9	6

RECEIPTS.	£	s.	d.
Brought forward	9	19	4
Subscriptions—			
Sixty for 1936-1937	15	0	0
Four for 1937-1938	1	0	0
Annual Dinner—46 at 6s. 6d.	14	19	0
Bank Interest	0	8	6
Bank Balance at end of Financial Year	0	2	8
	£41	9	6

Audited and found correct.

E. MARJORY LITTLE,
SUSIE H. O'REILLY,
Honorary Auditors.

The average attendance at meetings has risen from 24·5 during 1935 to 37·2 during 1936. Your Committee is gratified at the increase of interest in meetings, and hopes that the figure will rise still higher.

Special Meeting.—During the visit of Professor Winifred Cullis, Sophia Jex Blake Professor of Physiology in the Royal Free Hospital Medical School, the Society was fortunate to be able to arrange an evening on which she consented to address members. Her talk on pioneer women in medicine was greatly appreciated, also her mention of work of the International Federation of Medical Women.

Scientific Meetings.—Two papers were read during the year. The retiring President, Dr. Marjory Little, discussed the "Red Blood Cell", a much appreciated exposition of the clinical and pathological findings in the peripheral blood. Dr. Elma Sandford Morgan discussed the findings of the Department of Maternal and Infant Welfare in relation to maternal mortality in an investigation over the years 1929-1932. Graphs and tables were supplied to those present, and much informative discussion took place.

Clinical Meeting.—The honorary medical staff of the Rachel Forster Hospital arranged an excellent clinical evening, including presentation of cases, demonstration of œsophagoscopy, accompanied by a film, and case records from the psychiatry department in relation to problem children. This meeting has been made a biennial one, as the tax on the hospital staff is very great.

Annual Dinner.—This function was held at the Carlton Hotel for the second year in succession, and was again voted an enjoyable function.

PHYLLIS M. ANDERSON,
Honorary Secretary.

Post-Graduate Work.

COURSES OF PREPARATION FOR HIGHER DEGREES.

THE Melbourne Permanent Post-Graduate Committee announces the following courses of preparation for higher degree examinations.

Courses in anatomy and physiology for the primary fellowship of the College of Surgeons. Classes will be conducted by Professor Wood Jones, with the assistance of Dr. Sunderland, in anatomy, and by Dr. C. H. C. Kellaway, with the assistance of Dr. J. Hayward, in physiology, each evening from 5 to 6 o'clock, and on some Saturday mornings at 10.30 o'clock, at the University, commencing the last week in July and lasting until the examination in the latter part of November. Applications for admission to the course, together with fees, should be sent to the Honorary Secretary, Melbourne Permanent Post-Graduate Committee. Fee, twenty guineas.

Courses for first part M.D. and M.S. will be conducted on the condition that at least three candidates enter for each course: M.D., physiology, pathology, including immunology, fee £21; M.S., anatomy, physiology, fee £21. The courses will be conducted at the University during the second term, and should be taken by prospective candidates during the year preceding that in which they intend to sit for examination. The courses should be officially entered for and fees paid to the Registrar at the University prior to the commencement of the courses.

Courses for the Diploma of Public Health, Parts I and II, Diploma of Gynæcology and Obstetrics, Parts I and II, and Diploma of Diagnostic Radiology, Parts I and II, will also be conducted under similar conditions. Full information concerning these courses may be obtained from the Honorary Secretary, Melbourne Permanent Post-Graduate Committee, or from the Registrar, Melbourne University.

The committee will endeavour to provide clinical work in the wards and out-patient departments of the various hospitals for any who desire such work.

Further information may be obtained from the Honorary Secretary, Melbourne Permanent Post-Graduate Committee, 33, Collins Street, Melbourne, C.1.

Obituary.

HERBERT PERCIVAL BROWNELL.

WE are indebted to Dr. Henry Halloran, of Norwood, South Australia, for the following account of the career of the late Dr. Herbert Percival Brownell.

Dr. Herbert Percival Brownell, whose death occurred suddenly on April 26, 1937, whilst he was returning on the *Orford* from a brief holiday visit to relatives in Tasmania, was the son of the late W. P. Brownell, formerly member of the Tasmanian House of Assembly for the district of Huon.

Herbert Percival Brownell was born near Hobart on November 12, 1889. He was educated at Leslie House School, Hobart, Tasmania, and later at Scotch College, Melbourne, from which school he matriculated to the Melbourne University. He entered Ormond College, at which he remained throughout his course. During his time in college he achieved well-deserved popularity and esteem, and served on the students' council of Ormond in his final years. When the Great War broke out in 1914 he immediately enlisted, but was not permitted to embark until after his graduation in April, 1915. He went to Egypt as captain in the Seventh Field Ambulance. He served in the Gallipoli campaign until the evacuation. During this time he was wounded. After the evacuation he was transferred to France as regimental medical officer to the Twenty-Seventh Battalion. He was awarded the Distinguished Service Order for conspicuous gallantry and devotion to duty at Bullecourt; he was also promoted to the rank of major. After demobilization he spent a brief period in practice at Broken Hill and then settled

down in practice in Norwood and North Terrace, Adelaide. He continued his association with the Australian Army Medical Corps as commanding officer of the Third Field Ambulance. He became assistant director of hygiene of the Fourth Military District, attaining the rank of lieutenant-colonel. Later he was commanding officer of the Sixth Cavalry Field Ambulance. In these positions his enthusiasm and ability were an inspiration to all who were privileged to be associated with him. He was transferred to the unattached list in 1935. He was a foundation member of the Legacy Club and helped organize the Boys' Club eight years ago, as well as being chairman of the Girls' Club, and on the general committee. He was a member of the Board of Management of the Legacy Club. He was also actively interested in the "Toc H" movement and was a member of the United Services Masonic Lodge. Yachting and horsemanship were the sports that appealed to him most of all, but tennis also found a place in his busy life.

In medicine he was a general practitioner of the best type—guide, philosopher and friend to his patients, and also a man who kept constantly in touch with the march of progress in the field of medicine. He was a member of the South Australian Branch of the British Medical Association and served on the Branch council. He leaves a widow and three sons, to whom we offer our sincere sympathy.

Any account of "Val" Brownell or "Old Brownie", as he was known to his colleagues, would be inadequate which failed to portray something of the lovable personality of the man. His ambition was to be a good doctor and a good citizen. He certainly achieved his ambition in both spheres. Modest and quiet, he radiated his good nature and the kindness of his heart.

I have had the privilege of his friendship for twenty-seven years, and in that time I have never known him to pass a harsh judgement on a living soul. A peacemaker by nature, he never failed to interview personally a colleague should any possible source of professional friction arise. He made friends where another man would have made enemies. In spirit he was to the last an adventurous, lovable boy, whose name was never mentioned in tones other than those of genuine affection.

Dr. K. McKeddy Doig, of Colac, Victoria, writes:

The death of Dr. H. P. Brownell at such a comparatively early age came as a great shock to those of us who knew him so well. He always appeared such a robust man, so full of vitality, that it is hard to believe that he is no longer with us.

His was a happy nature. He enjoyed life, not in a sensual manner, but in a whole-hearted enjoyment of his work, of his friendships, of his family. The foundations of his character were so soundly laid that one instinctively knew that he would do his work well, that he would devote his life to the service of others, and I know that there are many sad hearts amongst his poorer patients, whom he so carefully tended. The underdog always appealed to him, and the opportunities that his practice offered him of helping the unfortunate would yield him intense joy.

Outstanding traits in his character were his courage, both moral and physical, and his great kindness and regard for others. He inspired affection as well as respect, and those of us privileged in his friendship will always look back with affection to his memory. He was essentially courageous, and in his younger days he delighted in feats which entailed risk and danger to his life. He did these things not in any vainglorious manner, but just to test his courage and endurance, and only in casual conversation would one find out what he had essayed.

He served throughout the Great War with courage and distinction, and was slightly wounded at Gallipoli. It was typical of him that when he received the wound in the chest he sat down, took out his stethoscope and listened to his own lungs to see if all was well. Luckily the bullet hit a rib and there was no penetration of the lung.

He read widely and well and thought deeply over what he read. His mind and body had to be active, and he took an optimistic view of life and felt that all would be well. This optimism was not, however, that of the lazy man. Rather, he felt that all would be well only if we all strove to help, and in this striving lay the secret of his optimism.

Val. Brownell is gone, but he has left behind him in many hearts a memory that will ever be recalled with affection, and the profession itself is poorer by the loss of one who strove so well to uphold its ideals.

Our sympathy goes out to his wife and family, and we hope that the high esteem and love we bore him will give some slight comfort to them in their great sorrow.

Dr. W. E. L. H. Crowther, of Macquarie Street, Hobart, writes:

The news of the very sudden death of Dr. "Val" Brownell on the royal mail steamer *Orford* at Port Melbourne was received with great regret in Hobart. Born there in 1889, he was the great grandson of Dr. Brownell, a pioneer colonial surgeon, and on his mother's side descended from Sir Robert Officer, himself a distinguished Tasmanian physician. My first experience of Brownell was on his arrival at Ormond College in 1908, and there he was one of a numerous group of Tasmanians taking their medical degree at the University of Melbourne. He was a prominent man at Ormond, and among other activities he rowed for his college.

When in 1915 the Seventh Field Ambulance (Second Australian Division) was formed in Tasmania, he was attached first as a bearer captain to the Tasmanian section and afterwards to the South Australian section, leaving with them for Egypt, where for the first time the ambulance train had a complete unit. Brownell was

a man of great physical strength, with very broad shoulders. As a boy he had been a first-class swimmer and keen yachtsman. When sixteen and staying at Eaglehawk Neck, one morning before breakfast he swam through the blowhole—a feat requiring as much courage as strength, and one which, as far as I know, has not been attempted since. To this physical strength he added a complete fearlessness. Before embarking to Gallipoli he was constantly chafing to be there and regretting he had not joined an infantry battalion as a combatant officer. His brother Lawrence was killed in action with the Twenty-Seventh Battalion, and the surviving brother, Raymond, is a distinguished officer in the Australian Air Force with a splendid war record. Gallipoli found Brownell in his element, and he did consistently good work during the whole tour of duty of the Second Australian Division on the Peninsula. After the evacuation he left the Seventh Field Ambulance and was posted as regimental medical officer to the Twenty-Seventh Battalion, of which his brother was an officer. The award of the Distinguished Service Order for personal gallantry in attending wounded at Bullecourt under severe shell fire and that he was three times mentioned in dispatches indicate the extraordinarily high quality of his work as a regimental officer. After the War he carried on his association with the Commonwealth Military Forces and was lieutenant-colonel and commanding officer of the Sixth Cavalry Field Ambulance from 1930 to 1935. He was one of the few men whom I have met who really liked the stress and dangers of active service. The long war years with ambulance and battalion personnel enlisted from South Australia must, I think, have decided him to practise medicine in that State. First at Broken Hill, afterwards at Adelaide, he built up a large practice, and his devotion to his work under home conditions was as marked as when at the War. Only last week he passed through Hobart, and while it was known he was in need of a holiday, no one anticipated his sudden death. Brownell was always young in his manner and outlook on life, simple and direct, with a big kindly heart—a most loyal friend. We who served with him will remember him.

Correspondence.

THE MODERN TREATMENT OF SQUINT.

SIR: After reading the recent correspondence in the journal between Dr. J. Bruce Hamilton and Dr. Temple Smith on the subject of orthoptic training, I am regretfully compelled to point out that neither one has appreciated the full significance of my letter on the subject, which was quoted in full by Dr. Temple Smith.

I was moved to write that letter originally by an editorial in the journal of October 3, 1936, which asserted, amongst other things, that "the busy ophthalmic surgeon cannot devote his time" to orthoptic training, and further, that if he were to choose to do so, the fees necessary to recompense him for his efforts would be beyond the reach of most patients. In a letter of October 17 Dr. Hamilton hastens to support the first proposition, and Dr. Temple Smith in his recent article brings forth as a further excuse that "the work is arduous in the extreme and calls for much patience, time, and the possession of the right temperament". It is surely unnecessary to point out that both assertions are indefensible, morally and scientifically.

The first duty of every practitioner of the art of medicine, not excepting the "busy ophthalmic surgeon", is to his patient. If he is not prepared to exert himself to the best of his ability, he should not accept the care of the case. If his fees are so high as to be beyond the reach of most people, it is not at all improbable that he will be able to recommend colleagues whose estimate of the value of their services is not based on such a grand scale as his own, and whose knowledge and skill may possibly be comparable with his.

To turn to the scientific aspect, I fear that both Dr. Hamilton and Dr. Smith must be classed as "armchair philosophers" who would glean their knowledge in comfort, at second-hand. I know of no advance in medicine that was made without a great deal of effort nor of any problem that did not demand "patience, time, and the possession of the right temperament". The excellent essay of Dr. Travers bears the imprint of all these qualities.

In conclusion I would like to point out that I do not wish to condemn orthoptic training. It is my opinion that the surgeon should carry out the training himself for the protection of his patient and to further his own knowledge, whilst exploring the almost unknown land of binocular vision. Systematic work in this direction would prove of far greater value than a hurried trip to Europe and America. "The busy ophthalmic surgeon" might even be tempted to read a little and find to his amazement that little has been added to the knowledge of binocular vision since the time of Helmholtz, and that "abnormal correspondence" was described in the sixties. The only modern feature of the condition is its use as an explanation of the failure of those cases of squint in which it is present, to respond to training.

Yours, etc.,

KEVIN O'DAY.

33, Collins Street,
Melbourne,
June 7, 1937.

Congress Notes.

AUSTRALASIAN MEDICAL CONGRESS (BRITISH MEDICAL ASSOCIATION).

Travelling Facilities.

THE Joint Honorary Secretaries of the fifth session of the Australasian Medical Congress (British Medical Association), to be held at Adelaide on August 23 to 28, 1937, advise that Airlines of Australia have agreed to grant a 10% concession on the usual fare for Queensland members travelling from Brisbane to Sydney. The proviso is made, however, that tickets must be purchased from the head office, 10A, Martin Place, Sydney.

The Trade Exhibition.

Intending members of congress are reminded of the importance of the trade exhibition. At all congresses it has been customary to have a trade exhibition at which leading firms, having for sale goods that are likely to appeal to members of the medical profession, have taken stands and have displayed their wares. The firms have naturally included those whose products are most useful in medical practice. It has come to the knowledge of the executive committee that many of the firms have been disappointed with the interest shown in the exhibits by members of past congresses. The hope is expressed that at the Adelaide Congress members will remedy this defect. It is, indeed, in their own interest to do so, for products of the kind exhibited are essential to medical practice, and space is let to reputable and reliable firms only. A suggestion has been made that the president of congress and the presidents of sections should draw the attention of members to the trade exhibition, and we hope that this will be done. The South Australian members are taking an interest in this exhibition; we understand that it is their objective that every person attending congress should visit the trade exhibition and take an interest in the exhibits.

Corrigendum.

AT the head of the article entitled "Contemporary Neuro-Surgical Practice", by Dr. Gilbert Phillips, which was published on May 29, 1937, it was incorrectly stated that the author is an honorary assistant surgeon at the Royal Prince Alfred Hospital, Sydney. Dr. Phillips informs us that this should read "Honorary Assistant Neuro-Surgeon".

Books Received.

A TEXT-BOOK OF MENTAL DEFICIENCY (AMENTIA), by A. F. Tredgold, M.D., F.R.C.P., F.R.S.E.; Sixth Edition; 1937. London: Baillière, Tindall and Cox. Medium 8vo, pp. 570, with illustrations. Price: 25s.

THE MENACE OF BRITISH DEPOPULATION, by G. F. McCleary, M.D.; 1937. London: George Allen and Unwin Limited. Crown 8vo, pp. 148. Price: 4s. 6d. net.

PRESSION SOLAIRE: FAISCEAU ÉNERGÉTIQUE ET BIOLOGIE BIOGENÈSE ET PATHOGENÈSE, by G. Froin; 1937. Paris: Librairie Girardot et compagnie. Crown 4to, pp. 327.

A MEDICAL FORMULARY, by E. Q. Thornton, M.D.; Fourteenth Edition; 1937. Philadelphia: Lea and Febiger. Double foolscap 16mo, pp. 363. Price: $2.75 net.

Diary for the Month.

JUNE 22.—New South Wales Branch, B.M.A.: Medical Politics Committee.
JUNE 23.—Victorian Branch, B.M.A.: Council.
JUNE 24.—New South Wales Branch, B.M.A.: Branch.
JUNE 24.—South Australian Branch, B.M.A.: Branch.
JUNE 25.—Queensland Branch, B.M.A.: Council.
JULY 1.—South Australian Branch, B.M.A.: Council.
JULY 2.—Queensland Branch, B.M.A.: Branch.
JULY 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
JULY 6.—New South Wales Branch, B.M.A.: Council (Quarterly).
JULY 7.—Western Australian Branch, B.M.A.: Council.
JULY 7.—Victorian Branch, B.M.A.: Branch.
JULY 9.—Queensland Branch, B.M.A.: Council.
JULY 13.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
JULY 20.—New South Wales Branch, B.M.A.: Ethics Committee.

Medical Appointments.

Dr. E. C. Chisholm has been appointed Government Medical Officer at Barellan, New South Wales.

* * *

Dr. J. W. L. Piccles has been appointed, pursuant to the provisions of the *Quarantine Act*, 1908 *to* 1924, Quarantine Officer at Carnarvon, Western Australia.

* * *

Dr. J. Cataranich has been appointed Inspector of Inebriates' Institutions, in accordance with the provisions of the *Inebriates Act*, 1928, of Victoria.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser", pages xiv to xvi.

FREMANTLE HOSPITAL, FREMANTLE, WESTERN AUSTRALIA: Junior Resident Medical Officer.
NAREMBEEN ROAD BOARD, NAREMBEEN, WESTERN AUSTRALIA: Medical Officer.
ST. VINCENT'S HOSPITAL, SYDNEY, NEW SOUTH WALES: Honorary Officers.
UNIVERSITY OF MELBOURNE, VICTORIA: Senior Lecturer in Histology and Embryology.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment referred to in the following table without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCHES.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 135, Macquarie Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association, Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17.	Brisbane Associate Friendly Societies' Medical Institute. Proserpine District Hospital. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY Hospital are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.
SOUTH AUSTRALIAN: Secretary, 175, North Terrace, Adelaide.	All Lodge appointments in South Australia. All contract Practice Appointments in South Australia.
WESTERN AUSTRALIAN: Honorary Secretary, 205, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.

Editorial Notices.

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